THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIII. No. 572.] LONDON, APRIL 28, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
AND
ANTI-GALVANIC PAINT.
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
STEVENS AND CO.,
London Office, 21, Great Winchester Street, E.C.

HENRY SKOINES,
PATENTEE & CONTRACTING GAS ENGINEER
FOR
SETTING RETORTS,
ERECTING AND REMODELLING
GAS-WORKS OF ANY EXTENT,
AT HOME OR ABROAD.
ADDRESS—
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.
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JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE, } LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
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MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETER, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SCOTTISH CANNEL COAL.
J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.
Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.
Coal, machinery, fire goods, &c., shipped to all parts of the world.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.

AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.,

PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; AND 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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LIVERPOOL: No. 63, Paradise Street. | PARIS: No. 38, Rue du Chateau d'Eau.

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DANIEL HOWARD,

Successor to the late BENJAMIN WHITEHOUSE,

(ESTABLISHED IN 1765,)

BOILER AND GASHOLDER WORKS,

Westbromwich, near Birmingham.

MANUFACTURER OF TELESCOPE AND SINGLE GASHOLDERS,

WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

And all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, and ESTIMATES FURNISHED.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS.

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

LIME SUPERSEDED

IN THE

PURIFICATION OF ILLUMINATING GAS,

BY

Spence's Patent Dry Copperas,

The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.

TESTIMONIALS SENT ON APPLICATION.

SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,

VICTORIA CHEMICAL WORKS, ASHTON NEW ROAD, BRADFORD, MANCHESTER,

Manufacturers of SPENCE'S PATENT DRY COPPERAS; GREEN COPPERAS;

SPENCE'S PATENT GAS DEODORIZER;

SULPHATE OF AMMONIA, GREY AND BROWN; SULPHURIC ACID; MUDIE'S DISINFECTANT, &c.

CONTRACTORS FOR THE PURCHASE OF SPENT OXIDE.

ALL COMMUNICATIONS TO BE ADDRESSED TO THE WORKS.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

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WELLINGTON TUBE-WORKS,

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MANUFACTURER OF

PATENT WELDED WROUGHT-IRON GAS, STEAM, HYDRAULIC, GALVANIZED, & ENAMELLED TUBES & FITTINGS.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

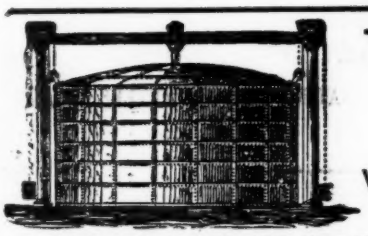
AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS, GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over twelve years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints for which purpose it is superior to White Lead.

THE IMPERIAL METER COMPANY, LIMITED,

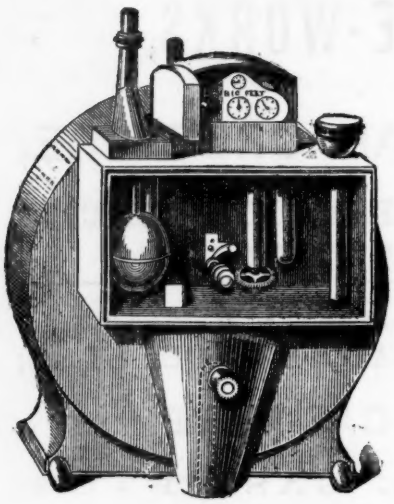
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

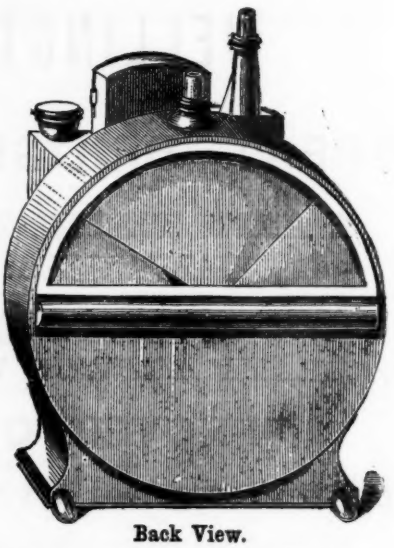
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

SPECIAL ATTENTION

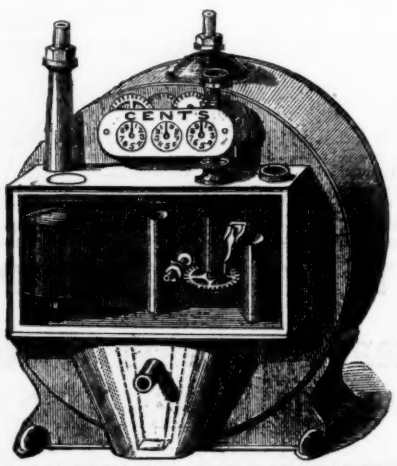
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER.

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

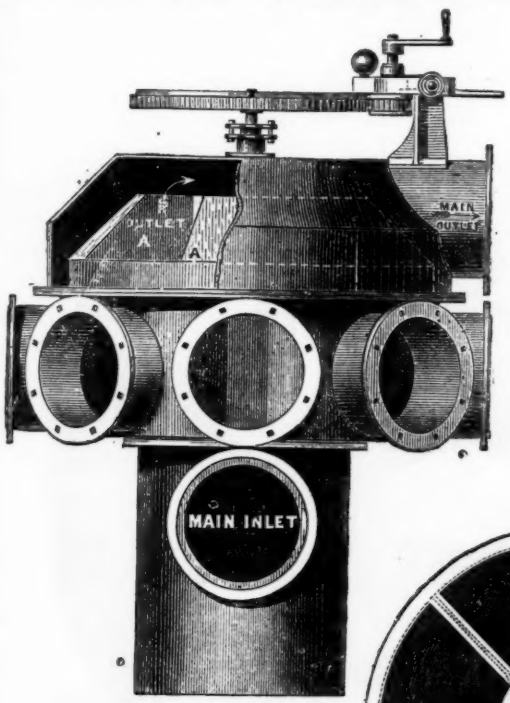
An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

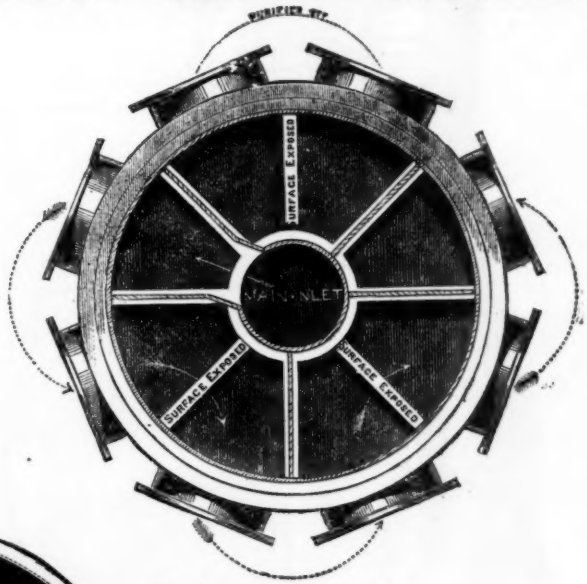
☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

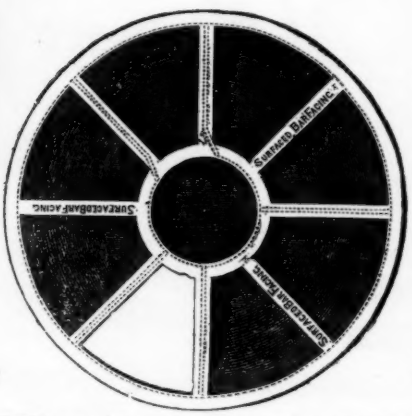
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

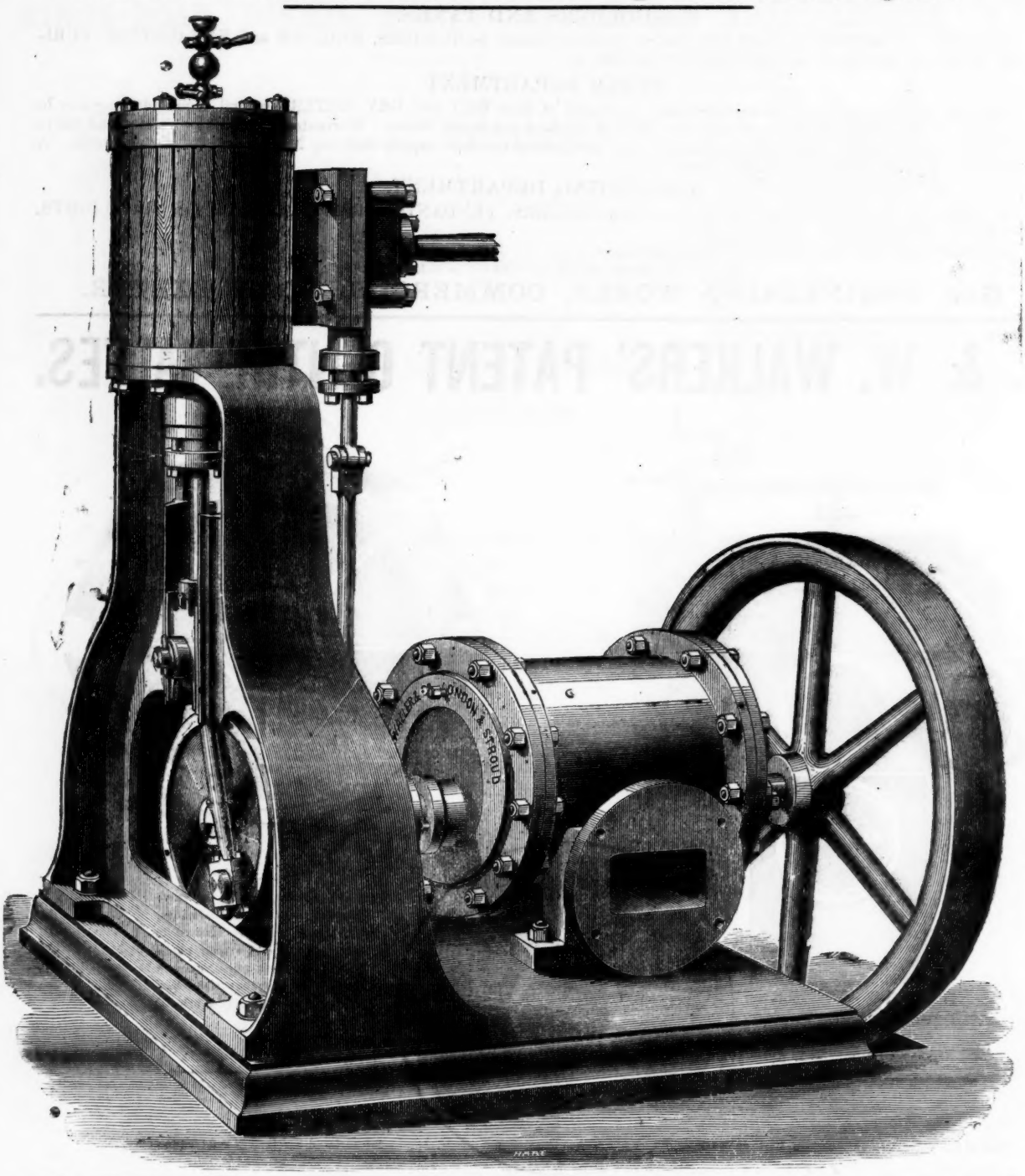
SOLE MAKERS OF

Beale's Improved

PATENT GAS-EXHAUSTERS AND COMBINED ENGINES,

ON ONE BASE PLATE.

NOTE.—The Exhausters are extra large for moderate speed.



This COMBINED VERTICAL ENGINE and EXHAUSTER was specially designed by G. Waller and Co. for small works, where space is an object, and is applicable for Exhausters from 1000 to 15,000 per hour. This is the *only* Engine and Exhauster **complete on one Base Plate,** requiring only one foundation.

Note.—They are sent away complete, and are easily fixed.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

AND AT

STROUD, GLOUCESTERSHIRE.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

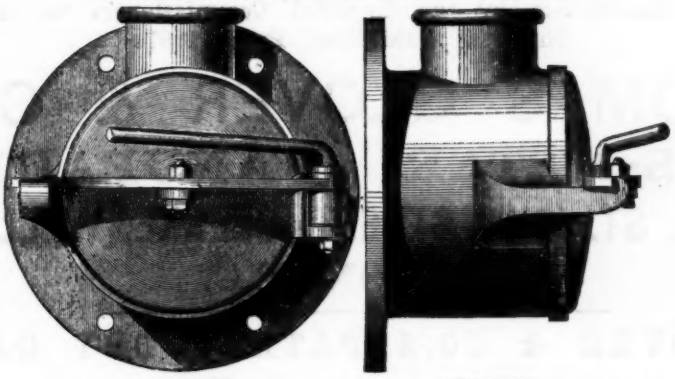
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 10,000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydfil Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

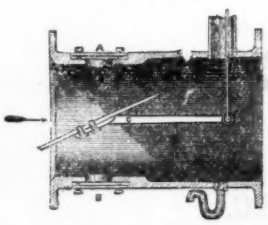
The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.*

"Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) "F. J. EVANS."

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

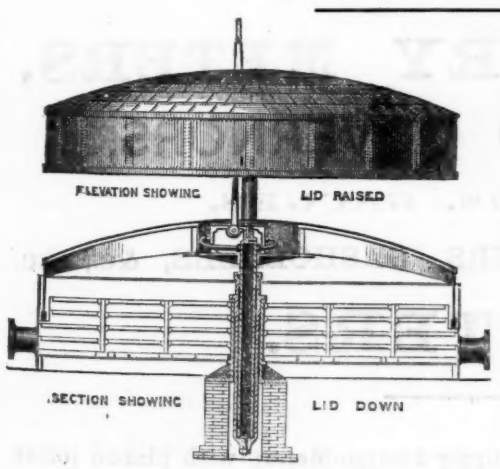
The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Company—a 24 in. at Whitechapel District Station.	The Gaslight Company—a 6 in. at the Gas-Works, Beckton.
" " a 36 in. at Goswell Road Station.	The London Gas Company—an 18 in. at the Gas-Works, Nine Elms.
" " a 24 in. at " "	" " an 8 in. at " "
" " a 24 in. at the Gas-Works, Beckton.	" " a 24 in. at " "

Also at the Gas-Works, Rochdale, Monmouth, Devonport, Cannes, and Mentone (France), &c.



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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 28, 1874.

Circular to Gas Companies.

It would be simple affectation on our part to pass without notice the continued agitation against the metropolitan gas companies. With only three exceptions, we rather think all the vestries in the metropolitan district have joined in urging, sometimes the Metropolitan Board of Works, and now the Government, to do something for the relief of the gas consumer, who, it is roundly asserted, is simply robbed by the companies. The press, daily and weekly, re-echo the wild statements made by venal agitators and ignorant vestrymen, and join in the almost universal outcry that "something must be done." As to what that "something" ought to be, our friends are by no means agreed. There are some who think that the companies should be bought up by the Metropolitan Board of Works; but the Board, wisely, we think, shrink from incurring the responsibilities which would be thrown upon them by the purchase. A brighter thought has struck Colonel Beresford, who recently accompanied a deputation of his constituents to the Board of Trade. Placed in a delicate position, as director of a gas company and member of Parliament, with every conceivable motive for conciliating the electors of Southwark, the gallant colonel made a desperate plunge, and boldly recommended the purchase of the gas companies by the State. The recommendation was safe, seeing it is never likely to be acted upon. Sir Charles Adderley, the new President of the Board of Trade, refused to commit the Government to any measure of that kind. Urged, in effect, to promote some measure to bring about an equalization of the price of gas in the metropolis, the president replied that the question was surrounded with difficulties, and that he did not see how any remedy could be applied to the evils alleged to exist, without some new legislation which must deal with general questions and not with particular companies. To the necessity for this new legislation we have several times alluded; and, on the expiration of the Gas and Water Works Facilities Act Amendment Act, it becomes inevitable. If the opinions we have expressed as to the probable permanent increase in the cost of coal be accurate—and, with our knowledge of contracts made this season, we see no reason to doubt the accuracy—some measure to regulate maximum prices must be passed in the next session of Parliament. What this measure shall be may, to a great extent, be settled by the action of the gas companies who are interested, and our object now is to call the attention of our readers to the necessity for giving a full and dispassionate consideration to the matter. The Amendment Act just referred to was concocted in a hurry at the Board of Trade. It was an ill-considered, and even unjust, measure; but was accepted at the time, since it promised relief to undertakings then in urgent need of it. The operation of the Act has been eminently unsatisfactory. Few undertakings have availed themselves of its provisions; and, to some of these, the result has been delusive.

The question arises, how is the price of gas to be regulated in the future? for we may assume that the "new legislation" will make provisions for some kind of regulation. The maximum prices of some Acts will not to-day give a profit, and, unless we are to have a large number of Private Bills or Provisional Orders, some general enactment must be promoted to meet the difficulty. The metropolitan agitation, in this respect, comes to the aid of country companies, who are now at a disadvantage. It is grumblingly accepted by the consumer in London that the price must be such as will yield maximum dividends; and it must be asserted in the strongest possible manner that any measure which prejudicially affected this vital point, would be simply an act of confiscation. The present generation of shareholders have paid for their shares on the faith of a presumed legislative guarantee of a certain dividend, and to reduce that dividend would be simply to mulct the shareholder in an equivalent proportion of capital. There is, we are happy to say, in the metropolitan agitation, no evidence of any desire to confiscate the property of gas proprietors. There seems to be a strong opinion that the operations of some of the companies are wasteful and extravagant, and there is a strong desire to see them subjected to some control. It will be of no use for us to reply to the accusations and complaints made. We may, however, and do, assert, that the business of the metropolitan gas companies is conducted with as much intelligence and as much honesty as any commercial undertakings in the world. Capital is not intentionally wasted; coal is bought as cheaply as possible, and residuals are sold for the highest price they will fetch. It is a misfortune that the companies are not equally circumstanced as regards their capital accounts; but that is a grievance which cannot now be remedied. We have to deal with matters as they stand, and, whenever the purchase of the undertakings comes to be considered, all must be dealt with alike.

The Standing Orders Committee of the House of Commons have reported that no sufficient reasons have been shown for suspending Standing Orders in the case of the Birmingham Gas Bill, and, therefore, the Bill must be proceeded with as originally introduced, without the clauses empowering the Corporation to purchase, or the Bill may be altogether withdrawn. An alternative course suggests itself—viz., that the company should proceed for a small amount of capital, as the Belfast Company did last year, the question of the purchase standing over until next year. Our parliamentary intelligence shows that the Corporation of Birmingham are opposed by all the surrounding local authorities whose districts come within the present gas limits. We are not aware of the objects of the opposition, but they may be easily guessed. The Corporation of Birmingham are going in to make a profit out of the gas undertaking for the benefit of the borough, and, in all probability, the Local Boards object to this form of indirect taxation. Each one would like to have gas-works of their own for the benefit of their own district, and we are bound to say that the desire is natural. The time which must elapse before other Bills can be brought forward may be profitably occupied by the Corporation of Birmingham in arranging terms with these outlying authorities, so that they may, to some extent, share in the profits which must accrue from the possession of the undertakings.

The Corporation of Dublin, acting first of all on the opinion of Serjeant Armstrong, that they have no power to expend a farthing of corporate money on the promotion of a Bill, and next on a report from Mr. Foulis, of Glasgow, that they cannot expect to

make a profit on the gas undertaking, even if purchased at the rate proposed last year, have withdrawn the Bill they have promoted to effect a compulsory purchase of the gas company. The Bill of the company will now, we hope, proceed with comparatively light opposition, for Mr. Foulis's report must effectually disarm the opposition of the Corporation. We have not yet seen this document, and without a knowledge of the reasons given we can express no opinion on the conclusions arrived at. In the absence of such knowledge, we must adhere to the belief we have expressed, that the terms offered by the Corporation were inadequate, and that the directors were right in refusing them. We shall be sorry to find ourselves mistaken, but we have still faith in the future of the company, if successful with their present Bill, and under good management; it is, however, impossible to disguise the fact that the Bill now promoted is essential to their continued existence. Ill-luck in the meantime continues to pursue the company. Still unrecovered from the crash of the works at Bray, the roof of one of the largest retort-houses in Dublin now falls in, and entails on the company a heavy loss.

We may call attention to an interesting lecture, "On the Economical Combustion of Coal Gas," delivered by Professor Wallace, to the Philosophical Society of Glasgow, and reported in another column. The professor, it will be seen, combats, to some extent, our views as to exclusive employment of cannel coal in the production of gas, and advocates the continued use of a rich gas, cannel being supplemented by the employment of shales, which yield even a richer gas. These, while American petroleum continues cheap, will remain comparatively inexpensive, and be more available for the production of gas than of oils. In another part of the lecture, the professor expresses a substantial agreement with Mr. Key, in the opinion that Scotch consumers do not get the full value of their rich gas, in consequence of the use of imperfect fittings. He calculates that, in Glasgow alone, the money value of the waste from this source represents a sum of £130,000 a year. We commend this fact to the notice of gas agitators in London, and will only add an opinion of our own, that the loss to consumers in this metropolis, from the same source, does not amount to less than £500,000 a year.

WATER AND SANITARY NOTES.

When a body so slow to move as the College of Physicians, step, we will not say out of their way, to memorialize the Government on the subject of the habitations of the poor, the state of the case may be considered urgent; as, indeed, it is. Without piling up the agony as some of our contemporaries have lately done, it may be admitted that there are portions of this metropolis which are a disgrace to our civilization. Much, we might say most, of this state of things could be remedied, if our local authorities would exercise the powers they now possess. But it is notorious that, somehow or other, owners of the worst class of property find seats in vestries and District Boards, and that the exertions of a conscientious officer of health are paralyzed by the want of support from his employers. We are as much opposed to centralized interference with local self-government as any; but it is impossible to deny that at the present time some sort of compulsion is necessary to oblige our local authorities to perform their manifest duties. It seems to be the desire on all sides, that the present shall be an easy session of Parliament, and, perhaps, it is well that it should be so. Rest will give time for reflection; and, by next session, the present Government may have matured those measures of sanitary reform, which, before they took office, their leaders announced to be the greatest want of the day. Among the measures most urgently called for is one that will give local authorities stronger powers in dealing with houses which are practically uninhabitable, but which, nevertheless, produce the landlords large returns on the capital they have expended in the purchase of leases. We have the greatest sympathy with Sir Sydney Waterlow, who has done so much for the improvement of the dwellings of the poor, and some also with the trustees of the Peabody fund, who have hit on the happy expedient of making a charity pay. But it must be remembered that the erection of a few huge barracks, in which 200 or 300 families can be decently accommodated, makes little or no impression on London misery. If Sir S. Waterlow's company and the Peabody trustees had power to buy up court and alleys, and would put the houses in decent sanitary condition, they would bring the benefits of their institutions to a lower class of the population than they have yet reached, with commensurate advantages to the whole community. For this reason we hope that the Government will give their aid when compulsory powers are asked for the purchase of property, with a view to provide improved dwellings. The Corporation of the City of London have been frequently mentioned of late in connexion with this matter. That body are under a strong moral, if not some legal obligation, to provide houses for the poor in the Holborn valley. They have, however, entirely neglected this duty, and seem bent on leaving the land vacant, until they can get exorbitant ground-rents. Public opinion is now roused on the matter, and the Common Council may remember that it is never too late to mend.

The inhabitants of a small portion of London have recently suffered from a casualty which may occur more often when the metropolis is supplied with water under a constant service at high pressure. Two mains of the New River Company burst nearly at the same time, and it took two or three days to complete the repairs. During this interval the water was of necessity shut off from one district, and much inconvenience was felt, but the inconvenience would have been much greater if the houses had had no cisterns.

The Westerham inquiry, to which we alluded in our last number but one, has been concluded, and in the end it was determined to divert both the brewery and the house drainage from the "long pond," and carry these, together with the general sewage of the town, into a stream below, the brewery referred to contributing handsomely towards the expenses of constructing the sewer. Probably the next we shall hear of Westerham sewage will be that an injunction has been obtained to restrain the Local Board from pouring their sewage into this stream.

The Water Committee of the Corporation of Liverpool are still closely occupied with the future supply of the city and neighbourhood, and it seems to be conceded that a further source of supply must be found. In the meantime, since the new supply cannot be made available for probably ten years, it has been resolved that the engineer (Mr. Deacon) shall proceed with the formation of 20 additional waste-water districts, in addition to the 30 already sanctioned, and place meters upon them, and stop-cocks upon each house, with the object of preventing all the waste of water which is practicable. As to the sources from which it is proposed to obtain the additional supply, we have, as yet, no information; the report of Mr. Jackson, the consulting engineer of the Corporation, not having yet been made public.

We are happy to see that a good understanding has been come to between the Corporation of Chester and the water-works company, and that the opposition to the company's Bill will consequently be withdrawn. The company have agreed to give a continuous supply for 16 hours a day, and have made some concessions which qualify the clauses thought to be arbitrary and unjust. It has also been agreed to reduce the amount of capital asked, for the idea of the purchase of the undertaking at some future day not having been relinquished by the Corporation.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XI.

Historical Introduction.

(Continued.)

The patent of Stephen White, for producing hydrogen-gas by the decomposition of water, and combining this with the rich gas derived from Boghead, cannel coal, resin, tallow, or other bituminous and oleaginous substances, (identical in principle with the patent obtained by Donovan), at this period, (1850), excited a large share of attention, both in the gas world, and among the public generally, in consequence of the highly favourable reports made respecting it by an eminent chemist, and a not less eminent engineer. According to the accounts of these gentlemen, by the process in question, 50,000 and even 75,000 cubic feet of 12-candle gas could be obtained from a ton of Boghead, and ordinary illuminating gas, was said to cost about 1s. per 1000 feet. The statements were so flattering that several manufactories in Lancashire, and some small towns in England, were lighted with gas produced according to this patent, and with the view to test the real merits of the process, experiments of long duration, and on extensive scales, were made at the Manchester Gas-Works, and at the South Metropolitan Gas-Works in London, but the results of these operations and experiments clearly demonstrated how little the carefully conducted experiment of the laboratory could be relied on, and that the real merits of an invention can only be ascertained by actual practice. According to the laboratory experiment, the system was a great success, but every-day practice proved it a complete failure. This arose from several causes, the most fatal being the great irregularity in the supply of hydrogen, which at one period was produced in excess, when the gas was so poor as to give hardly any light; whilst at another time, there being a deficiency of hydrogen, the rich gas was supplied without its diluent, causing great inconvenience by the excessive smoke evolved in burning, besides occasioning a dead loss to the company. Every endeavour was made to ensure the success of the undertaking, considerable capital was invested therein, and practical men did their utmost; but the affair was a total failure, with the loss of a large amount of money. Still, as we see at the present day, this did not deter others from entering on the same kind of operations.

The success of the Great Central Gas Consumers Company led to much agitation among the consumers in the south of London, who considered that they should be supplied at the same price as the inhabitants of the City. The companies then sup-

plying the district refused to accede to any reduction, and their refusal led to projects for establishing a rival enterprise. For this purpose the consumers were canvassed, when upwards of 5000 of them signed contracts agreeing to take gas of the projected company so soon as they were in a position to supply it. On the faith of this promised support, the "Surrey Consumers Gaslight and Coke Association" was founded by deed of settlement in March, 1849.

However, during the period that the new works were in course of construction, the old companies reduced their price, and the consumers, having thus secured the substantial benefit they desired, were utterly forgetful of the interests of those whom they had induced by their promises to invest capital in a new undertaking. Accordingly, when the works were completed, and the association was in a position to furnish a supply of gas, the directors found, to their great mortification, that not one-fifth of those who had pledged their support, were willing to redeem their promises.

The establishment of the Surrey Consumers Association subsequently led to the most important advantages to the other metropolitan gas companies. In 1853, the late Sir John (then Mr.) Thwaites, being chairman of the Surrey Company, was impressed with the great losses attending the ruinous competition existing between the various undertakings, and entered into negotiations with the directors of the companies on the south side of the Thames, with the view of coming to some arrangement, in order to avoid this disastrous state of affairs, so prejudicial to their respective interests, without being in any manner beneficial to the public. The proposition was favourably entertained, and the same year was decided and carried into operation, a system of districting, by which each company was limited to a particular area of supply.

Four years afterwards the same system of districting was adopted amongst the companies on the northern side of the Thames—an arrangement that has contributed in a wonderful manner to their success, without being in any way prejudicial to the public.

The first periodical devoted exclusively to the spread of information amongst persons engaged in the supply of gas was established in London, in 1846, by the late Mr. Thomas Greaves Barlow. It was entitled the *Gas Gazette*; but the work did not receive much support from the profession, and, after the issue of five or six numbers, it was abandoned.

In February, 1849, Mr. Barlow established the JOURNAL OF GAS LIGHTING, which, at the commencement, was published quarterly, with an intermediate supplement on the 10th of each intervening month. The first number was remarkable for containing a very able and comprehensive article, from the pen of the editor, proposing the amalgamation of the metropolitan gas companies, the majority of which, at the time, were in fierce competition. It was further remarkable on account of an excellent article, by Dr. Fyfe, "On the Comparative Value of Coal for the Purpose of Illumination;" and, lastly, for the introduction to the notice of the gas world, of the late Alexander Wright (who afterwards attained an eminent position in the profession), by the publication of an article by him, "On Coal and its Products by Distillation."

Both these gentlemen were able contributors to the JOURNAL for some years. To Dr. Fyfe is especially due the merit of making known the errors, or fallacies of the hydrocarbon gas process, at a time when the greatest uncertainty existed as to its value. The labours of Mr. Wright are so well known as not to require mention here, although, when treating on various subjects, we may have occasion again to refer to him.

The services which Mr. Barlow rendered, through the medium of the JOURNAL, to gas companies, has so recently been sketched by an able and esteemed coadjutor of the late editor, that it is needless now to expatiate upon them. The advantages that have arisen from the liberal exchange of ideas between engineers, and others, in these columns, the value of the general information which the JOURNAL has systematically conveyed to its readers, for now more than a quarter of a century, concerning the manufacture and distribution of gas, and the various inventions and improvements connected therewith, is sufficiently attested by the steady and continuous progress in its circulation, and the position to which it has attained.

In 1852, the first number of *Le Journal de l'Eclairage au Gaz* was published in Paris, and in 1857 a second French periodical, entitled *Le Gaz*, devoted to the same subject, was established. In 1858 the American *Gaslight Journal* made its first appearance, and in the same year the *Journal für Gasbeleuchtung* was started at Munich. All these publications still exist, and are very ably conducted.

Prior to this time, and for a few years afterwards, the prospects of gas companies were disheartening in the extreme, demanding, on the part of the directors, the utmost energy to meet the circumstances in which they found themselves placed; and so rigid was the economy observed by the Chartered Company in order to meet the difficulties, that, amidst other retrenchments and savings, they actually relinquished premises they had occupied for many years in Blackfriars as offices, and transferred their business to their works in the Horseferry Road, formerly called the Peter Street station.

The principal cause of these troubles was the cry for "cheap gas," and the necessity forced on the companies to diminish it below a remunerative price—at least, as the operations of gas manufacture were then generally conducted. Moreover, the epoch was exceedingly fertile in the production of various schemes, with the view of superseding coal gas. The most remarkable of these was the patent of Shepard for a "means of producing gases by the action of currents of electricity on water having chemical matter dissolved in it." According to a prospectus issued in Paris, preparatory to the formation of a company (the *Compagnie Générale du Gaz Electrique*) for working this patent; by the process, it was stated hydrogen could be produced at 3½d. per 1000 feet, which, in order to be available for lighting, was afterwards to be enriched by hydrocarbons, as well understood. The capital proposed for the enterprise was no less than two millions sterling; and, as invariably happens under like circumstances, the scheme had its scientific supporters, amongst them some eminent French *savants*, who gave the most flattering accounts of the process. However, on impartial investigation, it was ascertained that in the decomposition of water and ingredients (the "chemical matter dissolved" therein being oxalic acid and sulphuric acid) one-third of the resulting gases consisted of carbonic acid, the other being hydrogen, thus forming a compound almost valueless for the purpose intended, whilst the cost of production was more than one hundred times greater than stated in the prospectus, and, in consequence of this discovery, the gigantic bubble exploded.

Another cause of alarm was the proposed introduction of the electric light. This is produced by a powerful voltaic battery, having at the end of each of its electrodes a piece of charcoal in the shape of a pencil, these being placed with their points opposite to each other, and separated by only a very short distance. The battery being charged, the charcoal is ignited, and a most intense light is produced, but one by no means suitable for domestic purposes. This light was exhibited in various places of amusement in the large towns of England and the Continent. The cost of the material necessary for producing the requisite electricity, however, prevented the system being generally applied.

The Electric Light and Colour Company was projected about the same time. According to the prospectus of this company, the residues of the process just described were to be employed as pigments, and, were to realize such prices that the cost of light would be merely nominal. The means of producing hydrogen, by decomposing water through electro-magnetic agency, was also brought before the public; but the power employed in the process was not compensated by the value of the gas produced.

About the same time Gillard was busily employed with his platinum light, which for a time held forth great expectations. Lastly, although not directly antagonistic to gas companies, White's hydrocarbon process excited the public attention for some years, until daily practice proved the fallacy of the system, when it was discarded. With these and other similar enterprises, therefore, and the flaming reports which accompanied their presentation to the public, it is not surprising that great uneasiness existed amongst the proprietors of gas property.

We are led to believe, however, that the evil was not without its accompanying good; and that gas directors and engineers at this critical time were stimulated to great exertions to surmount their troubles. The importance of clay retorts and the exhauster now began to be appreciated and generally applied throughout England. The great loss sustained by leakage from the mains also became matters of serious consideration, and were attended to. Contracts, either for public or private lighting, were no longer made at ruinous prices, but remunerative rates were established. A general examination of the consumers meters was made, when a considerable number of them were found in such a decayed state as to permit a large portion of the gas to pass, without being indicated; and, probably, the depressed state of gas property caused directors eagerly to accept the first propositions of districting. Whether arising from the causes assigned or not, at this date vast improvements were made in the manufacture and distribution of gas.

(*To be continued.*)

THE INTERNATIONAL EXHIBITION.

(SANITARY DEPARTMENT.)

Second Notice.

In our last article, at page 545, we gave a general description of the leading features of those companies who propose to relieve, by chemical treatment, the metropolis and all towns and villages of the United Kingdom, of the evils arising from sewage. On the occasion of our last visit to the International Exhibition, there was no sign on their part of an exposition of their schemes, although some were making progress to that end. We shall, therefore, have to reserve our remarks on this subject for another article, and for the present shall deal with those exhibits which have another phase of sanitary questions for their object.

Prominent among these are the various earth and dry closet systems, patented by Moule, Goux, and other inventors. The general feature of all these schemes is that of receiving the excreta in a pan, as voided, in which either earth or some other absorbent matter is placed or supplied to deodorize the solid and liquid matters. Moule was the first to bring the earth system into general operation. His plan is simply that of supplying, at each motion, a quantity of dry earth, which, falling on the fæces, &c., not only covers them, but removes all offensive odour, and produces a manure that has been highly estimated for garden use. In the Exhibition three forms of this "closet" are shown. One, "self-acting," is estimated to cost from £3 7s. 6d. to £3 15s. It consists of a seat, pan, &c. As each motion is voided, a sufficient quantity of dry earth is liberated from a reservoir to deodorize the excreta, the reservoir containing a sufficient charge to supply a week's, or further use. In the "pull-out" plan the user supplies the earth by drawing out a horizontal plug. This kind of closet is estimated to cost about £2 5s. The "pull-up" class is of a more ornamental kind, resembles in its action an ordinary water-closet, and has an estimated cost of £5 5s. From these, and all the closets we have to describe, the deposit has to be periodically removed, and, with one exception, house slops, and other house refuse, are rigidly forbidden to be cast into the closet. It hence appears, that while the advantages of such closets in a sanitary point of view are very great, they present many inconveniences that must necessarily

limit their general adoption. For all practical purposes, we must state that they are only applicable to places where the midden or cesspool systems are prevalent, so far as large towns are concerned; but their chief application should be in agricultural districts. Mr. Moule's system has been largely adopted in such districts, and justly so, as Government and other reports have proved.

Goux's sanitary closet will be seen close to those of Moule, at the Exhibition. The mechanical arrangements, as in other cases, make the action automatic. But this kind differs from Moule in the fact that the absorbent or disinfectant, or both, forms an inside lining of the pan, into which the excreta fall. Mechanical arrangements prevent offence both to the senses of sight and smell. We have experimented largely on this kind of closet, commode, &c., and found that, if the necessary conditions are properly attended to, the results are good, but, perhaps, not equal to those of the Moule system. The refuse of the pan is periodically removed by carts, which, of course, must be a cause of expense—said, however, to be covered by the value of the manure produced. We believe that at Halifax, where we first saw this system in practical working, the results were generally satisfactory, but we are without any reliable statistics in reference to the value of the manure produced. Possibly about 30s. per ton, on the spot, may be within its real agricultural value. This, of course, will depend upon the absorbent employed, which varies from wool or cotton waste to the refuse of dye-stuff, and, in fact, almost any other absorbent material.

Other closets, differing slightly in their mechanical arrangements, are also exhibited. Among these, the following are of most interest. Parker's Patent Automaton Earth Closets and Inodorous Commodes are intended alike for use in the cottage and the mansion. They are self-acting, and directly the seat is relieved from the pressure of its occupant, the evacuations are covered with dry earth, precipitated from an adjacent reservoir; and, consequently, all offence against smell, &c., is avoided. These closets and commodes are made of any size, and those for privies, out of doors, may be supplied with earth sufficient for a whole year's use, while the commode used in the house has more limited accommodation in this respect. Slops are forbidden to be sent down, as in the case of Moule, Goux, and most earth systems.

In Gibson's plan a somewhat similar arrangement is adopted in respect to the earth supply, but this is actuated by the person using the closet pressing on the step below the seat. But this plan has the distinctive feature of receiving the urine and fæces in separate receptacles, and if the urine is run off to the house drain, slops may be poured down that receptacle, a condition which presents many advantages beyond those afforded by other closets, which, as already stated, forbid the introduction of house-slops. King's Patent Self-Acting Dry Closets are intended to be used either with charcoal, earth, or ashes. The Peat Engineering and Sewage Filtration Company are the holders of the patent, and they state that while the Box Charcoal Commodes are neat and convenient for use in any apartment, they have the merit of cheapness, being supplied at 25s. each. They are self-acting, and, by their peculiar construction, their object cannot be detected by the ordinary observer.

Among a great variety of miscellaneous sanitary appliances, lavatories, closet-pans, drain-traps, &c., abound, but we failed to find any very special point in which novelty or excellence could be mentioned; not that ingenuity was wanting, but it appeared to us that in many cases genius of invention had forgotten really practicable results. Among exhibitors, in this department, are Pullen and Son, Doulton, Jennings, and many other well-known firms. Nelson and Son, of Briggate, Leeds, exhibit an apparatus for disinfecting clothing, bedding, and other matters by heat, in which an external thermometer indicates the maximum of safe temperature.

Among special arrangements connected with water supply, Stidder's patented sanitary articles may be noticed, in some of which traps are so introduced as to prevent the ingress into the house of sewer gases or vapours. We are, however, of opinion with Mr. Deacon, the borough engineer of Liverpool, that the best mode of trapping is that carried on not only inside but outside of the house—that is, immediately adjacent to the street-drain which receives the house refuse.

The exhibits of charcoal intended for disinfecting or deodorizing purposes are numerous and interesting, especially in regard to that material as produced from peat. This form of charcoal, from its great porosity, is very valuable for such objects. Among disinfectants of a liquid kind chlorozone is shown. It is stated that this liquid is a combination of a permanganate with chlorine or a chlorinated alkali, in such a form that nascent oxygen and chlorine are simultaneously available for disinfecting purposes, and that it is not liable to spontaneous decomposition; consequently its effects are lasting, with a smaller cost than that of most other articles of a similar character.

WITHDRAWAL OF THE DUBLIN CORPORATION GAS BILL.—A special meeting of the Municipal Council of Dublin was held on the 21st inst., for the purpose of taking into consideration the opinion given by Serjeant Armstrong upon a case submitted to him in relation to the promotion of the Corporation Gas Bill. After some conversation thereon, Alderman Durdin moved the following resolution:—"That it is absolutely necessary to withdraw, forthwith, the gas bill promoted by the corporation, which we regret was ever sanctioned by a majority of this council; and that our law agent be directed forthwith to withdraw the same." Mr. Dockrell seconded the motion. Alderman Redmond moved as an amendment—"That the resolution of the Gas Committee be adopted—viz., that, on consideration of all the facts in reference to the above bill, we now recommend the council to withdraw the same." Mr. Murphy seconded the amendment, which was put and carried by a considerable majority.

Correspondence.

GAS PURIFICATION.

SIR,—In reply to Mr. Anderson's friendly and courteous exhortation that I should come to the next meeting of the Gas Managers' Association, I beg to say that I have received a kind invitation from the president, Mr. Livesey, and that I will be most happy to be present.

Meanwhile, in the hope that I have not trespassed over much on your valuable space, I crave your indulgence for the following remarks upon a passage in an excellent little book which you recently noticed in terms of deserved commendation.

A correspondent, well known in the gas world, has called my attention to a passage (p. 55) in the "Handbook for Gas Engineers," which shows (what I have frequently observed in other cases) how readily, by inadvertence, a quotation may be made which has either no bearing upon the point at issue, or which, as in this case, proves the very opposite of the opinion or statement in support of which it is adduced.

The author of the "Handbook" has, very properly, availed himself of the various reports on gas purification issued by the late Referees (all of which were prepared by myself), and he speaks of these reports in the very highest terms—as, indeed, was done by the successive presidents of the Gas Managers' Association, in their inaugural addresses. He also alludes in similar terms to my own particular researches and inventions in gas purification. As regards my new process of using lime—namely, in such manner as to *produce* sulphide of calcium to any extent that may be desired, and thereafter to *employ* the said material in a thoroughly efficient and reliable manner by decarbonating the gas before it enters the purifiers in which the sulphide of calcium has been produced—the author says truly that no such process had ever previously been in use. But he adds that the "principle" of the process had been stated by Dr. Letheby, in a lecture delivered before the Gas Managers' Association, in 1870.

Now, the word "principle" is so frequently used in a vague sense, that had Dr. Letheby's statement been anything near the mark, I certainly would have offered no objection to the author's remark. I should have let it stand for what it was worth. But it so happens that Dr. Letheby's words, on the occasion in question, not merely do not support the author's remark, but directly contradict it; and as they express the best knowledge that then existed as to the employment of lime for the purification of gas from bisulphide of carbon, it may be interesting even on general grounds to quote them. They are as follows:—

"The lime is purposely left in the purifiers after it has become foul, and until a good deal of the sulphuretted hydrogen first absorbed is displaced by carbonic acid. In this manner the natural affinity of sulphide of calcium for bisulphide of carbon is permitted to act, and much sulphur in this objectionable form is retained. . . . In the case of sulphide of calcium, it should be permitted to act for some time after the lime has become foul, for it is in this condition that it is most effective, and a lime purifier should not be changed until the sulphuretted hydrogen of the foul lime is largely displaced by the carbonic acid of the raw gas."

It is needless to observe that there is here no process for producing sulphide of calcium as I have given, nor for decarbonating the gas before it enters the sulphide of calcium, for the author of the "Handbook" acknowledges that no such processes were employed, or even recommended, by any one before me; but even the "principle" of the foregoing quotation—which is, that lime in purifiers acts most efficiently upon the bisulphide of carbon after it is being carbonated and desulphuretted—is entirely wrong. The "principle" of Dr. Letheby's statement, in his own words, is, that in order that "the natural affinity of sulphide of calcium for bisulphide of carbon be permitted to act," "the lime is purposely left in the purifiers after it has become foul, and until a good deal of the sulphuretted hydrogen first absorbed [not prior to, but simultaneously with, CO_2] is displaced by carbonic acid." Every one knows *now* that this is wholly wrong, and that from the moment that a purifier becomes "foul" (*i. e.*, when the issuing gas contains H_2S), the sulphur in all forms, both SH_2 and CS_2, which it may have previously absorbed, are rapidly displaced and expelled from it by the carbonic acid in the gas, which has a greater affinity for lime than the sulphur has.

It is also to be observed that so late as the middle of March, 1872, when Dr. Letheby inspected, and thereafter reported upon, the failure of the sulphur-purification at the Beckton works, he made no recommendation, or even mention of any process in any way resembling mine. The only suggestion or recommendation contained in his report (dated March 18, 1872) as regards the lime purifiers, is "the use of lime in the purifiers for a much shorter time than is now practised—that is, *for about twenty-four hours* (instead of four days) *after a purifier has shown signs of foulness.*" In other words, for 24 hours after the lime has begun to be *desulphuretted*, and thereby rendered totally useless for absorbing bisulphide of carbon, or sulphur in any form!

The same opinion was expressed, or repeated, by Mr. Anderson three months afterwards, at the meeting of the Gas Managers' Association in June, 1872, when he made the following recommendation:—"If the lime is removed from dry-lime purifiers the moment it [the gas] gives a black test by acetate of lead paper, a great mistake is committed, because the lime will continue to do good in the purification of gas for a long time after it ceases to attract the whole of the sulphuretted hydrogen." Whereas it does nothing of the kind; the lime, in fact, from the moment when it gives off H_2S, being rapidly converted into the inert form of carbonate.

In fact, the best *opinion* (for of precise *knowledge* there was none) that existed on the subject of sulphur purification was that "foul" lime—*i.e.*, lime from which H_2S was passing forward—somehow or other took out some portion of the sulphur in other forms than sulphuretted hydrogen; although it is the fact that "foul" lime was always chiefly, and it might be wholly, carbonate of lime, which does not and cannot absorb sulphur in any form. And the notion or idea was that the longer the lime was kept in the purifiers the better—as was practically adopted at Beckton, after the lime was used before the oxide of iron, in compliance with the reiterated injunctions of the Gas Referees.

Surely the practice at the Beckton works, above all others, may be taken as showing the best method then known of sulphur purification. The works were designed, and the processes of purification directed, by Mr. Evans, one of the most eminent of gas engineers, assisted by Mr. G. Trewby, and in constant communication with Mr. Harris, who certainly knew as much about the use of lime as any one else. Nevertheless, the

result, as regards sulphur purification, was an utter failure. And what was the method adopted? As shown by the daily records supplied by Mr. Trewby to the Referees, and published in their Report, each of the lime purifiers was kept in action from *nine to twelve days!*—whereby the lime was converted into carbonate, and, of course, did not take out a particle of the bisulphide of carbon.

R. H. Patterson.

21, *John Street, Adelphi.*

"LONDON" ARGANDS *V.* SILBER BURNERS.

Sir,—In the exercise of his discretion, Mr. Silber refuses to clear up in any way the hazy report upon which the assertion of the superiority of the Silber burner over all others is based. He now adopts the idea I threw out in my last letter, and says that the report was not intended as a public announcement.

We are, therefore, to suppose that it was quite by accident that the statement made by Lord John Hay of the further triumphs of the managing director of the Silber Light Company appeared in several of the leading journals, as well as in the organ of the gas world. Mr. Silber continually accuses me of rushiug into print for the purpose of puffing my burners; yet, curiously enough, in all directions, I find that Mr. Silber seems to possess a magical power over the leading organs of public opinion, and makes them see his inventions in the most charming light possible, and imagine that the meetings of the Silber Light Company are as important to the world as those of Parliament.

Are there such things as Silber rose-tinted spectacles, as well as Silber rose-tinted lamps?

The scientific part of the question being now shelved for some time, the experiments which I had prepared, and which might have proved interesting to your readers, must be left for another time.

I note the fact, nevertheless, that Mr. Silber now declares the burner, mentioned in the latter part of Mr. Valentin's report, to be that described in my copy of Mr. Kirkham's evidence upon gas-burners, given before a committee of the House of Lords, session 1869. This appears in my published description of the "London" burners for the use of the trade and consumers (I enclose copy). He also says that those burners mentioned in the latter part of Mr. Valentin's report as "ordinary burners," are to be found in the same copy of the evidence of Mr. Kirkham, and they are there described as follows:—No. 4, Hall's patent Argand, 12·68 candles; No. 5, German Porcelain, 12·57 candles; No. 6, Bengel burner, 12·46 candles; No. 7, Sugg's patent "London," for rich gas made to burn 6 to 7½ feet of common and 5 feet of cannel gas, 12·25 candles (the report intimates this as an unfair test to this burner); No. 8, Hall's patent Argand, 9·63 candles; No. 9, Evered's iron top Argand, 9·24 candles. Mr. Kirkham gives the names of the burner makers, and states that the quality of the gas with which they were tested was 14·32 candles, and that the burner used as standard of comparison was the Sugg-Letheby Argand, 15 hole, at a pressure of ·085 of an inch at the point of issue.

This latter your readers are aware was the standard burner at that time.

The form of table he uses might well be adopted by any one else, when it is desired to show the comparative value, as regards illuminating power, of burners or lamps, although, for indicating the value to general consumers, another mode of testing should be adopted, which I shall be ready to define when the time arrives for so doing.

These admissions by Mr. Silber appear to discredit in a remarkable manner the statement made by Lord John Hay—for if the Silber burner was really compared with the one mentioned in this table, the test was utterly unfair.

The "London" standard burner for 14 candle gas, as you will perceive by reference to the instructions of the gas referees, is the No. 0 or C burner, and not the No. 1 or D burner with 24 holes, which is here mentioned. Not only this, but of course the whole of the results obtained, and the startling conclusions which are drawn from them, are consequently illusory. I will not take up your space with the experiment which I have by me, showing what the difference would be, because I think Mr. Silber will probably like better to let you have it himself when the "Silber burner comes into general use," &c.

From the facts which I have elicited, I feel convinced that I have amply justified the request I made in my first letter, and which I now reiterate, that the gas world will please not accept the statements made by Lord John Hay as reliable until the extremely one-sided report he has based them upon is verified.

Having probably got tired of the standard burner question, Mr. Silber now seeks to lead me into a discussion with him as to the merits of Hinks and Wells's duplex lamp, and the cost of gas compared with petroleum. I beg most emphatically to decline. Should Messrs. Hinks and Wells think fit to apply to me upon the subject, I shall be most happy (having mentioned their lamps) to give them my reasons, which I think they will deem satisfactory, for so doing, but I recommend Mr. Silber to leave this matter entirely to them. Since I have been engaged in this controversy, many voluntary statements have been made to me from various parts of the country, from which I am induced to believe that the gas world is much indebted to the firm, about whose interests Mr. Silber evinces such a laudable anxiety, for the direction given to the Alexander-like mind of the managing director of the Silber Light Company, who, not content with his success in oil lamps, now seeks fresh triumphs in gas-burners.

His anxiety to shine in the gas world appears to be equalled by his desire to prove me inaccurate in something or other—he does not appear to be particular what; and, in order to do so, he gives himself the trouble of perusing my paper on "Standard Burners," and, having got into a hopeless muddle over it, takes down the price current of petroleum, and with it deals me a crushing blow.

If the information is of any use to him, I can tell him that the price per gallon, quoted by his own agents in various parts of London, ranges from 3s. (best) to 1s. 8d. (inferior); pints, 4d. (best) and 3d. (ordinary quality, such as is made use of by the majority of consumers in poor neighbourhoods). A comparison of these figures with those quoted by Mr. Silber in his last letter will enable your readers to perceive that our views as to the comparative cost to the public of gas and petroleum are likely to differ very widely. It might, however, be useful to gas managers and to those now using lamps if Mr. Silber or Lord John Hay would kindly tell us what will be the relative cost of petroleum, burned in the Silber lamp, and gas, burned through the new Silber gas-burner, light for light; and also whether Lord John Hay reckoned the 50 per cent. saving he promises to the prospective happy proprietors of the Silber burner, upon the same principle as that on which Mr. Silber reckons the comparative cost of petroleum, oil, and gas.

Vincent Works, Westminster, April 24, 1874. W. Sugg.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, April 20, 1874.

Gas Orders Confirmation Bill.—Read a second time, and committed to a committee of the whole House, on Tuesday, the 28th inst.

A petition against the Broadstairs Water (No. 1) Bill, which is also in favour of the Broadstairs Water (No. 2) Bill, was presented by the ratepayers and inhabitants of Broadstairs, &c.

Tuesday, April 21.

Fairfield Local Board Bill.—Report from the Select Committee, that the committee had not proceeded with the consideration of the Bill, no parties having appeared in opposition thereto.

Thursday, April 23.

Dublin Corporation Gas Bill.—The Viscount Eversley informed the House that the promoters do not intend to proceed further with the Bill during the present session.

Beverley Water Bill.—Report from Select Committee read:—That it is not expedient to proceed further with the Bill.

A petition in favour of the Neath Corporation Bill was presented from merchants and others of Neath.

HOUSE OF COMMONS.

Monday, April 20, 1874.

Wakefield Water Bill.—Report, in respect of non-compliance with the Standing Orders, referred to the Select Committee on Standing Orders. Two petitions for additional provision referred to the Examiner of Petitions for Private Bills.

Municipal Corporations (Borough Funds) Act, 1872.—Petitions for alteration were presented from the Corporation of Liverpool and from the Huddersfield Union.

Requisitions to withdraw petitions against the following Bills were lodged:—Musselburgh and Dalkeith Water from (1) Duke of Buccleuch and Queensbury, (2) Trustees and Local Authority of Dalkeith; Peterborough Gas from Peterborough Improvement Commissioners; Ulverston Local Board from Ulverston Gas Company; Wakefield Water from Sir Lionel Milburne Swinnerton Pilkington, Bart., and Thomas Fletcher Twemlow.

The *locus standi* of the following petitioners has been disallowed:—John Heugh against the Tunbridge Wells Gas Bill; the Local Boards of Hindley and Pemberton, and Ralph Darlington and others against the Wigan Improvement Bill, except as against clause 83, and so much of the preamble as relates thereto.

Metropolitan Gas Companies.—Sir Charles Dilke gave notice that on Thursday, April 23, he would ask the President of the Board of Trade when the annual accounts of the metropolitan gas companies will be presented.

Tuesday, April 21.

The Belfast Corporation Gas and Chester Water Bills were read a second time, and committed.

Birmingham Gas Bill.—Report, on petition for additional provision, in respect of non-compliance with the Standing Orders, referred to the Select Committee on Standing Orders.

Wigan Improvement Bill.—Report, on petition for additional provision, that the Standing Orders have been complied with; instruction to the committee on the Bill, that they have power to make provision therein accordingly.

Municipal Corporations (Borough Funds) Act, 1872.—Petition for alteration was presented from Halifax.

Requisitions to withdraw petitions against the following Bills were lodged:—Horbury Local Board, from Lancashire and Yorkshire Railway Company; Wakefield Water, from the Penistone and Thurlstone Local Boards.

The Hythe Improvement and Water Bill was referred to. A Select Committee, consisting of Mr. C. B. Denison (chairman), Sir Joseph Bailey, Mr. A. H. Brown, and Mr. Ashbury, to meet on Wednesday, April 29, at twelve o'clock.

Wednesday, April 22.

Municipal Corporations (Borough Funds) Act, 1872.—Petition for alteration was presented from the Corporation of Stockport.

A petition in favour of the Truro Water Bill was presented by the ratepayers of Truro.

A petition against the Tunbridge Wells Gas Bill was presented by the inhabitants of the district of Tunbridge Wells.

A requisition was lodged by the London and North Western Railway Company to withdraw their petition against the Wigan Improvement Bill.

The *locus standi* of the Corporation of Halifax as petitioners against the Horbury Local Board Bill has been disallowed.

Thursday, April 23.

Metropolitan Gas Companies Accounts.—Sir Charles Dilke's notice deferred till Monday, May 11.

Wakefield Water Bill.—Report, on petition for additional provision, in respect of non-compliance with the Standing Orders, referred to the Select Committee on Standing Orders.

The Airdrie and Coatbridge Water Bill was reported.

Petitions against dispensing with the Standing Orders of the petition for additional provision in the Birmingham Gas Bill were presented from (1) West Bromwich Improvement Commissioners, (2) Tipton Local Board of Health, (3) Smethwick Local Board of Health, (4) Oldbury Local Board of Health.

A petition against the Truro Water Bill was presented from owners and ratepayers of Truro, the petitioners not praying to be heard.

Requisitions to withdraw petitions against the following Bills were lodged:—Birmingham Gas, from Henry Wright; Horbury Local Board, from Wakefield Water-Works Company; Wakefield Water, from Midland Railway Company; Wigan Improvement, from Leeds and Liverpool Canal Company.

Friday, April 24.

The Mid-Lothian Water Bill was read a second time, and committed.

The following resolution from the Standing Orders Committee was reported:—That, in the case of the Birmingham Gas Bill, petition for additional provision, the Standing Orders ought not to be dispensed with.

Municipal Corporations (Borough Funds) Act, 1872.—Petitions for alteration were presented from Manchester, Scarborough, and Chepping Wycombe.

The Fylde Water Bill was reported.

The petition for additional provision in the Padiham Water Bill was referred to the Examiners of Petitions for Private Bills.

A petition against the Birmingham Gas Bill was presented from William Robb.

The Hornsey Local Board lodged a requisition to withdraw their petition against the Wakefield Water Bill.

SATURDAY, APRIL 25.

The Wigan Gas Company lodged a requisition to withdraw their petition against the Wigan Improvement Bill.

HOUSE OF LORDS.

TUESDAY, APRIL 21.

(*Before Viscount* CARDWELL, *Chairman; Earl* ONSLOW, *Earl* ELDON, *Lord* ETTRICK, *and Lord* COTTESLOE.)

BEVERLEY WATER BILL.

Mr. DENISON, Q.C., Mr. LOCH, Q.C., and Mr. CRISP appeared for the promoters; Mr. ASPINALL, Q.C., and Mr. SAUNDERS for the Corporation of Beverley, petitioners against the bill.

Mr. DENISON, in opening the case, said the object of the bill was to supply the town of Beverley with water. The town was now supplied by pumps and wells, and the bill proposed to erect a pumping-station a short distance from the town, with a high and low level reservoir, and the scheme was a very cheap one. It was usually calculated that the cost of providing such works would amount to about £4 per head of the population; but this scheme would only cost £2 per head. The only point to be fought was what might be termed a political point—namely, whether a company should be incorporated to do the work which, the other side contended, and he was prepared to admit, ought to be done by the corporation; but they would not do it. The town of Beverley had a population of 10,000, was 10 miles from Hull, and might be called an agricultural town. It was notorious for its antiquity and its political purity. There was, however, an entire absence of any system of drainage; there were cesspools all over the town, and although the wells were deep they did not get into the chalk so as to obtain spring water, that which was secured being only surface water, and, he should show, of bad quality. There was also a considerable scarcity, and if a fire occurred the result must be that the fire and the water must take turns in their effects. It was therefore very clear that something must be done, and what ought it to be? As the corporation would not do it, a small number of people had put their shoulders to the wheel, and had got up a company. Although he did not say that all the money was to be found by Beverley people, he had no hesitation in saying that the objects of the company were not to make a large profit, but simply to supply what the inhabitants wanted, and what they were unable to get, because the corporation were obstructive. He might here tell the committee that Hull was supplied with water in the same way as it was proposed to supply Beverley; and in order to show that the objects were not simply those of profit, his clients were willing that a clause should be inserted, requiring them to sell the works to the corporation, if the corporation desired to have the control of them. The corporation grounded their opposition on the fact that they were already the owners of the gas-works, and that it was not desirable to allow any one else to interfere with the streets. They also said that there was an ample supply of water, which would be a question of evidence, and that the death-rate was very low, but that was to be accounted for by other circumstances, and there was no reason why the inhabitants should not have the best water they could obtain. The corporation further said that the works, if carried out, would affect the pumps and wells; but if the corporation did the work, the same result would take place. There were other grounds upon which the corporation opposed the bill, among them being the fact that they proposed to supply a district outside the town, and that there might, in consequence, be a dearth of water; but that was a matter of evidence, and he believed it would be shown that there was no chance of such a result taking place.

Dr. *Stretton*, Mr. *J. R. Pease*, banker, and one of the promoters, and several tradesmen of Beverley were called, and spoke to the necessity of a better supply of water; and the Rev. *C. M. Pim* and Mr. *D. Burton*, J.P., of Cherry Burton, said that the supply in the outlying districts was very inadequate. Mr. *Charles Hawkshaw*, C.E., explained to the committee the proposed works.

Evidence was also called to prove that the water now used is impure, and this closed the promoters case.

Mr. *Dale*, the engineer to the Hull Water-Works, was called, and expressed his disapproval of the proposed scheme for obtaining water.

WEDNESDAY, APRIL 22.

Mr. ASPINALL addressed the committee on behalf of the Corporation of Beverley, and contended that there had been brought before their lordships no amount of evidence that the public of Beverley were desirous of obtaining a supply of water through the new company. It seemed to be supported by persons interested in the matter, and not by the people of the town. There was plenty of machinery, it had been shown, in Beverley, to increase the water supply without any further interference on the part of a foreign company. On these grounds he called upon their lordships to reject the bill.

Mr. DENISON also addressed the committee on behalf of the promoters, and said that the corporation had done nothing to improve the water supply, and there had been plenty of evidence given to their lordships to show that the water supply was most defective. If the corporation neglected to supply the want, it was only equitable that there should be an independent company.

The committee, after a short deliberation, declared the preamble of the bill not proved.

WEDNESDAY, APRIL 22.

(*Before Lord* HANMER, *Chairman; Viscount* CANTERBURY, *Lord* FOXFORD, *Lord* ANNALY, *and Lord* WAVENEY.)

NEATH CORPORATION BILL.

Mr. S. POPE, Q.C., and Mr. MICHAEL appeared for the promoters; Mr. DENISON, Q.C., and Sir MORDAUNT WELLS opposed on behalf of the Neath Water-Works Company; Mr. STEVENS for the gaslight company; Mr. THOMAS, Q.C., on behalf of Mary Grant, Mr. Bushley, and Mr. Thomas, owners of the Knowle estate; and Mr. RODWELL, Q.C., and Mr. WILBERFORCE on behalf of the Great Western Railway Company.

Mr. POPE said the objects of the bill were to enable the Corporation of Neath to acquire the Neath Gas Company, the Neath Water-Works, and other purposes. He did not anticipate any serious opposition from the gas company, because, practically, the terms of an agreement for the purchase was agreed upon, and the present supply of gas to the town by the Neath New Gaslight Company had been inferior in quality and limited in quantity. It was also proposed to take powers for the compulsory purchase of the Neath Water-Works Company, which was incorporated in the year 1861. Since the passing of the Sanitary Act of 1866, the town had been for weeks together without any water supply. The water in the mains had been frequently turned off, and he should be able to show the committee that the supply of the town was at present most satisfactory. The question that would arise between the promoters and the water company was simply one of terms. He did not think he need go into the petition of the gas company, as he did not see Mr. Stevens in the room, and he thought that the company would now be supporters of the bill. If the water company would meet them on the question of terms, the promoters would be perfectly willing to meet them and give a reasonable sum; but they did not feel disposed to waste the public money by giving any extravagant sum that might be demanded by the company. There was a petition from the owners of the Knowle estate, who objected to the bill, saying that it was unnecessary, and objecting to the rates and charges. He objected to the *locus standi* of those petitioners, as it was contrary to the usage of Parliament to hear an individual ratepayer against a corporation who represented the general interests of the ratepayers. There was also a petition from the Great Western Railway Company, who had a right to take a certain amount of water. He objected to their *locus standi* also.

Mr. THOMAS contended that he had a right to be heard against the bill, as his clients had a separate and distinct interest.

The court allowed the *locus standi*.

Mr. WILBERFORCE contended that the railway company had a right to be heard as owners of land.

Mr. MICHAEL said, if the bill passed, the position of the railway company would not be altered.

The *locus standi* was allowed.

Mr. *David Bevan*, Mayor of Neath, and a number of other witnesses, were called in support of the bill, and gave evidence of the desirability of the transfer of the gas and water works to the corporation.

THURSDAY, APRIL 23.

Mr. *James Kempthorne*, solicitor at Neath, and a member of the Town Council, was called, and said he was fully acquainted with the condition of the water supply of Neath, and was of opinion that it was very bad, both as regards quality and quantity, and it was not at all adequate to the requirements of the town. It would be of great advantage if the gas and water-works both passed into the hands of the corporation. That was the general feeling of the inhabitants. The corporation had no wish to make a profit out of the undertaking, and could not do so under the Act. Their only object was to supply the town with cheap water and cheap gas. The trade and prosperity of Neath was likely to be greatly improved by the passing of the Neath Harbour Bill, now before Parliament, and there would be an increased demand, in consequence, for water and gas.

Cross-examined by Mr. DENISON: There was nothing to prevent the water-works company from increasing and improving the supply of water. The question was, would they do it?

Mr. *Thornton Andrews*, consulting engineer to the Neath Gas Company, was then examined, and stated that of late the consumption of gas in the town had greatly increased, and he expected it would continue to do so for some time at the rate of 7 per cent. per annum. The corporation proposed to purchase the gas-works at the sum of £33,000, and, if they received power to do so, they would be able to put by a reserve-fund, besides paying the interest on the purchase-money.

Mr. *George Stevenson* having given evidence in corroboration,

Mr. DENISON replied, on behalf of the Neath Water-Works Company, in opposition to the bill, arguing that it was quite unprecedented for a prosperous company, like the one he represented, to be compelled to sell their undertaking to a body of individuals at a rate which would cause great loss to the proprietors and shareholders. He contended that, even supposing the desirability of the scheme were established, the right way of determining the amount of compensation was on the basis of 25 years purchase, and not by a resort to arbitration. He proceeded to show the loss that would ensue to the shareholders of the company if the proposal of the promoters were carried out.

The CHAIRMAN, interposing, inquired whether the corporation were disposed to make any offer to the water-works which would be satisfactory to both sides, as otherwise the committee were of opinion that the water part of the bill would have to be struck out.

Mr. POPE said he was authorized to offer, and he did now offer, £20,000.

Mr. DENISON, however, said he could not accept those terms.

Some argument arose as to the basis of a calculation for the price of the water-works, and eventually the chairman, after a consultation with the committee, said their lordships had framed three resolutions—two relating to the water part of the bill, and one to gas clauses—for the consideration of the parties. With regard to the water, they decided first, that the provisions of the bill be amended by rendering the compulsory sale of the water-works conditional on the non-execution by the Water-Works Company of certain works within a certain time, to be hereafter specified, for the improved supply of the town of Neath; secondly, that the price to be paid for the water-works, under compulsory powers, be stated in the bill; and, thirdly, that the committee thought that the agricultural and rural populations of the borough should not be called upon to contribute to the gas-rate so long as no gas was supplied to them.

Mr. POPE asked that, as their lordships had intimated their opinion, an adjournment should be granted to allow of consultation.

It was then agreed that the further consideration of the bill should be adjourned.

HOUSE OF COMMONS.

THURSDAY, APRIL 23.

(*Before Mr.* MONK, *Chairman; the* MARQUIS OF HAMILTON, *Mr.* ONSLOW, *Mr.* HENRY O. LEWIS, *and Mr.* A. BONHAM-CARTER, *Referee.*)

THE TUNBRIDGE WELLS GAS BILL.

This bill was before a select committee this day and on Friday, but as the case for the promoters is not yet closed, we reserve our report.

SOUTHPORT (CORPORATION) GAS.—In our report of the recent Board of Trade inquiry at Southport, and the order made thereon, the name of the commissioner was stated to be Mr. G. A. Vernon Harcourt. It should have been Mr. L. F. Vernon Harcourt.

WYE AND SEVERN WATER.—Mr. John Horsley, F.C.S., analytical chemist to the county and city of Gloucester, gives the following comparative analysis of Wye and Severn water:—

	Total Solids per gal.	Oxidizable Matter.	Hardness.
Wye, at Hereford ..	7·20 grains ..	0·48 grains ..	6 degrees.
Severn, at Worcester ..	16·90 ,, ..	1·05 ,, ..	9 ,,

And also the estimation of the distilled water of the Wye for free ammonia and for albumencid ammonia:—

First, distillation with carbonate of soda for free ammonia ·0016 grains per gal.

Second, distillation with caustic potash and permanganate for albumenoid ammonia . . . . . nil.

Nor was there hardly any reaction produced by my pyrogallic acid test with the Wye water, showing most conclusively that there was little or no nitrogenous matter present in the shape of nitrates and nitrites, and therefore there could be no animal or sewage matter present, which confirms the distillation. The quantity of mineral or earthy substance in the water (which did not contain one grain per pint) was much too small to attempt to estimate them, and required a much larger supply of water than was sent to me, so that any further experiments were out of my power; but I see enough, as a water analyst of some years standing, to convince me that the water of the Wye, as supplied to Hereford, is about the softest and purest that can be imagined, and ought to be highly prized by the inhabitants.

Legal Intelligence.

ROLLS COURT.—THURSDAY, APRIL 23, 1874.

(*Before the* MASTER OF THE ROLLS.)

BOWER *v.* THE FOREIGN AND COLONIAL GAS COMPANY, LIMITED.

This was a motion having for its object the appointment of a receiver of the property and effects of the company, and that the company might be restrained by injunction from creating any charge or incumbrance on any part of the property and effects of the company, or otherwise dealing with such property and effects so as to injure the plaintiff's security. The plaintiff is a contractor, and sued as holder of debenture bonds amounting to £9000, upon which he alleged the whole principal and a portion of the interest were due. There was no dispute as to the interest being due, and the only question was as to the principal. The articles of association empowered the company to issue transferable and other bonds, debentures and obligations, to create mortgages, and so on. The form of the bond given to the plaintiff was to the following effect:—We, the Foreign and Colonial Gas Company, Limited, in consideration of the sum of £500 of lawful money of Great Britain, paid to us by George Bower, hereby assign to Bower, his executors, administrators, and assigns, "all and every the undertakings, plant, mains, and assets, real and personal, of the said company; and all and every the rents and profits thereof, and all the estate, right, title, and interest of the company of and in the same; to hold unto the said George Bower, his executors, administrators, and assigns, together with interest for the same at the rate of 6 per cent. per annum, payable at the several times in the coupons hereunto annexed, which shall be alone charged and chargeable with the said principal sum of £500 and interest."

Mr. FRY, Q.C. (with him Mr. BRADFORD), admitted that the bond was not felicitously expressed, but contended that it bound the whole undertakings of the company present and future. He said that before November, 1873, the plaintiff became aware that the company had fallen into difficulties, and was unable to meet its engagements. He felt apprehensive lest the property charged, as he contended, might be lost or cease to be available, and on Nov. 12 he gave a notice requiring immediate payment of principal and interest.

The MASTER OF THE ROLLS said people who took securities nonsensically expressed must not be surprised if the court hesitated in putting a construction upon them.

Mr. FRY said he was only asking the court at the present time to keep matters *in statu quo*.

The MASTER OF THE ROLLS did not think it could have been intended to create a charge upon all the assets of the company present and future; because, if so, how was the company to carry on the business?

Mr. FRY relied upon the Panama Company's case, reported in 5th Chancery Appeals.

The MASTER OF THE ROLLS did not consider the decision in that case applied, because it had reference to ships, and not to the undertaking.

Mr. FRY said the defendants admitted that since the plaintiff gave the notice they had issued a debenture to the New Gas Company, and they affected by that tc give a charge prior to that of the plaintiff. The company answered the plaintiff by saying that he was the contractor to make the Tunis works, that he had not duly performed his engagement, and that the defendants had a claim against the plaintiff for unliquidated damages, which they claimed to set off against the debentures.

The MASTER OF THE ROLLS said the only question was whether the plaintiff was entitled to a receiver. Upon the other point, it did not appear to him that he had any equity. It appeared to him that the meaning of the security was that the company gave an equitable charge, but that they were to carry on their business in the usual way.

Mr. FRY contended that the plaintiff had made out a *primâ facie* case to the relief sought.

The MASTER OF THE ROLLS considered the words "do hereby assign" must refer to a present and not a future security, and that what the company was doing the plaintiff had no right to complain of.

Mr. SOUTHGATE, Q.C., for the company, said the plaintiff was indebted to the company. The debentures were issued to the plaintiff, at his particular request, for a special purpose. He had failed to fulfil that purpose, and at one time had gone so far as to sign an agreement for a reference to arbitration as to what works he had not done. But, if the plaintiff would remove his attachment, the defendants would pay the amount of interest into court.

Mr. FRY was afraid that was giving up the best security they could get.

The MASTER OF THE ROLLS: Then I make no order on the motion, except that the costs be costs in the cause.

Miscellaneous News.

MAURITIUS GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the Offices, 29, Great Saint Helen's, London, on Wednesday last, April 22—WM. WHITE, Esq., in the chair.

The SECRETARY (Mr. A. Hersee) read the notice convening the meeting, and the following report of the directors:—

The directors beg to submit a statement of accounts for the twelve months ending the 31st of December, 1873, duly audited, and regret to have to report that, owing to a combination of adverse circumstances, the year's operations have resulted unfavourably, and no further dividend beyond the 2½ per cent. distributed in November last can be declared.

The item which has most prejudicially affected the prosperity of the company in the past year, and mainly contributed to diminish the profits, is the unprecedented by heavy cost of coal and freight, which it will be seen has very seriously increased the expenditure. The hopes of the directors that lower rates from Australia would prevail were greatly disappointed, for not only was the enhanced price of the raw material maintained, but the rate of freight advanced to nearly double its former figure. Every exertion was made to effect consignments from England, but the terms demanded were quite prohibitory. A very considerable fall in the price of coal here having recently occurred, the directors have been enabled to conclude a charter on less onerous terms.

The shareholders were informed in the last report that a new manager, Mr. Monk, had assumed charge of the works on the 1st of January preceding. Unfortunately, this gentleman was attacked shortly afterwards by dengue fever, and was compelled to return home in the month of May. The directors lost no time in making a new appointment, and have confided the management in Mauritius to Mr. G. A. Delachi, who, from his having had several years experience in the conduct of similar operations in Corsica, appeared well qualified to fulfil the duties, and it is hoped he will realize the anticipations formed of his ability; but these changes of management have proved both costly and prejudicial to the interests of the company.

The crown of the gasholder has latterly shown unexpected signs of premature decay, and steps have been taken from time to time to repair it, but they have proved of no lasting benefit, for recent advices from Mauritius report the decay to be so rapidly increasing that the substitution of a new crown alone will effect a remedy. As this work cannot be executed while the gasholder is in use, the provision of a second gasholder has become compulsory, and a contract for the supply of the requisite new gasholder has accordingly been entered into; when this is erected and in operation, the opportunity will be availed of to put the existing gasholder in a state of thorough repair.

The foregoing unfavourable circumstances have occasioned the directors extreme anxiety and regret, inasmuch as the progress of the general business of the company is encouraging, and there is every reason to believe that, under ordinary circumstances, the results of the working will prove satisfactory. During the year 50 new consumers were obtained, 28 extra street-lamps erected, and 624 additional burners fixed in Government buildings and private dwellings. The total numbers of lights on the 31st of December, 1873, were—Public, 672; private and Government, 4287: compared with respectively—Public, 654; private and Government, 3663, at the end of the previous year. Orders are in hand for 58 new street lamps, and a satisfactory extension of Government and private lighting is anticipated.

The directors desire to acknowledge the assistance rendered by the members of the resident committee (J. A. Ferguson, Esq., Hon. M. Connal, and Hon. Henri Adam) in advancing the local interests of the company.

The director who retires by rotation is James Sydney Stopford, Esq., and the retiring auditors are John Robinson Peill, Esq., and Thomas Newton Stokes, Esq., all of whom are eligible for re-election, and offer themselves accordingly.

The CHAIRMAN, in moving the adoption of the report and accounts, expressed the deep regret of the directors in having to present such an unfavourable statement; but, as they had stated, a combination of adverse circumstances had occurred, and swept away the profit of the year. The rise in the price of coal was mentioned at the last meeting, but the indications of the market at that time pointed to a reduction; the contrary case followed, for Australian coal advanced to 14s. per ton, and the rate of freight advanced as high as 35s. per ton. Freight from England could not be got at a lower rate, while, until lately, coal fetched 18s. to 20s. per ton; so that nothing could be done from this side. The company had had great difficulty in getting supplied even at such exorbitant rates, for freights from Mauritius had ruled very low; consequently, vessels were not disposed to go there. The Government Railway was at one time so short of coal that it was feared the traffic would be suspended, and a cargo of Cardiff coal was sold at 72s. per ton. The Government contractors by their requirements ran the rate of freight from Australia up to 35s. and 40s. per ton, and had recently refused an offer by this company of 46s. per ton for a cargo of coals in harbour. The first two cargoes purchased this year of Australian coal would cost the company over 50s. per ton into store. The directors had just made a consignment from Hull, which would work out at about 45s. 6d., which was an improvement; but they hoped to do better as the sugar season came on. There had been a very considerable fall in coal in this country, which must in time bring down the price in Australia; while cheaper coal would bring steamers again into use, and cause more sailing vessels to be available, thereby reducing freights. Upon the whole there was every reason to hope that, after the present year, the existing oppressive cost of coal to the company would be greatly lessened. The directors had certainly been disappointed in their expectations of an earlier fall in price, but the fall was now an actual fact, and, if the rate of freight came down also, the company would be able to work more profitably. The change of management had been a serious evil to the company. Mr. Salisbury was recalled at the beginning of last year, and Mr. Monk took charge in January, 1873; but he had only entered upon his duties about three months when he was seized with an attack of dengue fever—probably brought from India in some Coolie ship—and quite prostrated. His efforts to get well, and to remain at his post, were unavailing; and the doctors ordered him off to England. During his brief stay he had commenced to repair the plant, which had been neglected; but his sudden breakdown was unfortunate, as leaving many things in an unfinished state. By one mail the directors were led to hope he would recover and remain, and by the next they learned of his leaving Mauritius. The merits of the present manager, Mr. Delachi, were brought to the notice of the directors, and, as he appeared very eligible in his knowledge of French and the possession of experience in the working of a similar undertaking, it was decided to appoint him to the management. As he only had charge of the works for the second half of the year, it was hardly fair to judge him in connexion with the accounts submitted; besides which, he had had to encounter unexpected drawbacks; he, however, appeared energetic, and the yield of gas per ton has increased since he took charge, and the directors were hopeful he will render the company good service. The decay of the crown of the gasholder has much surprised the directors, and they could not discover the cause of it. Mr. Monk in his first report drew attention to the evil, but stated that after certain repairs which he intended making the gasholder would not require anything more done to it for five years; but his prediction was not reliable, for towards the end of last year the decay became more evident, and all the temporary expedients to stop the leakage were fruitless, and a professional examination was made by practical persons at Port Louis, who reported that nothing but a new crown would effect a remedy. This involved the sending out of another gasholder—for a new crown could not be fixed while the holder was in use—at a cost of over £4000, and as skilled workmen would go out to erect the new holder, the opportunity had been taken to contract for the re-sheeting of the present one, at a cost of £800. When the work was completed, the company would be in a very safe position, and the reserve storeage ought to bring about a saving of fuel in gas manufacturing, by permitting a fire to be put out occasionally. The directors had not been blind to the advantage of possessing a second gasholder; but, as the storeage was so much in excess of the actual requirements, they deferred the outlay. The compulsion to provide it now, at a moment when the operations of the company were not prosperous, was much to be regretted; but the directors were sanguine that the present condition of affairs would prove but temporary, and that the company would, ere long, again be prosperous. With regard to the future, there was no occasion for alarm or anxiety. The present year would certainly not witness a return to their former prosperity, for they were still suffering from the evils of dear coal and the defective gasholder; but they were certainly justified in believing that the worst had been seen with reference to coals and freight, while the rectification of the gasholder would be completed in a few months hence. The gas-rental was increasing, new lights continued to be added, the street lighting was to be extended, and the municipality were about to take into consideration the request of the company for a modification in the hours of lighting the public lamps. The products sold readily at good prices, and, apart from unforeseen circumstances, the directors relied that their future reports would prove satisfactory.

The motion having been seconded by Mr. CHALONER SMITH,

The CHAIRMAN, in reply to inquiries, stated that every care would be exercised to make the new gasholder sufficiently strong; also, that the suggestions of Mr. H. P. Stephenson, in reference to painting, and of Mr. Osler, in reference to protecting the crown against the heat of the sun, should receive attention. The cost of the new holder, and repair of the existing holder, would be provided for by a call of 5s. per share about the 1st of October next.

The motion was then put and carried, the retiring director and auditors were re-elected, and the proceedings terminated with a vote of thanks to the directors.

MONTE VIDEO GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the Terminus Hotel, Cannon Street, London, on Thursday, April 23—JOHN BRAMLEY MOORE, Esq., in the chair.

The SECRETARY (Mr. J. T. Denniston) having read the notice convening the meeting, the following report was presented:—

The directors have the pleasure to submit to the shareholders the accompanying statement of accounts for the year ending the 31st of December, 1873.

The balance of profit on the year's working amounts to £42,477 18s. 4d.; of this sum the directors distributed to the proprietors, on the 1st of November last, an *ad interim* dividend of 4 per cent. for the first six months, thus absorbing £20,000.

The remaining balance, together with the sum of £589 11s. 11d. brought from last year, the directors propose to deal with as follows:—To pass the sum of £2750 to insurance and contingency fund, thus raising this fund to £9750, for the 18 months of the company's operations; and out of the balance then remaining of £20,317 10s. 5d., they recommend the payment of a further dividend of 4 per cent., completing a dividend

for the year at the rate of 8 per cent., free of income-tax; the balance of £317 10s. 3d. to be carried forward to the next account.

The high price of coals has seriously affected the profits of the year.

The extensions of the company's operations continue satisfactory, the number of additional houses consuming gas during the year is 251, making a total increase of 451 since the commencement of the company's working on July 1, 1872.

The number of public lamps has been augmented by 138 during the year, bringing the total to 2415.

The dock, though not yet completed, has earned an important special profit, from vessels using it for graving purposes.

The directors retiring by rotation are H. E. Baron de Mauá, and J. L. C. de Salles, Esq., who, being eligible, offer themselves for re-election.

The auditors, Mr. John Cater and Messrs. Price, Holyland, and Waterhouse, retire, and offer themselves for re-election.

The CHAIRMAN, in moving the adoption of the report, said it would not be necessary for him to detain the meeting for more than a few minutes, as the directors had endeavoured to make the report a full and complete account of the affairs of the company. The progress during the past year had been very satisfactory, considering the difficulties which they had had to encounter, more especially with reference to the question which came home to every one present—viz., the exorbitant price of coal. Notwithstanding that, he was happy to say that the dividend to be declared on this occasion fully realized the promises and expectations held out to the shareholders in the prospectus of the company. There was now a considerable fall in the price of the coal, so that in the current half year the directors would have less difficulty to contend with, and he hoped henceforward coals would remain at something like their normal price, so that the company would not only be able to pay 8 per cent. dividend, but very soon to go beyond. The extensions of the company's operations were also satisfactory. During the last half year there had been an addition of 251 to the number of houses supplied with gas, making the total number of private consumers obtained during the short time since the company was established 451. This could not be regarded as otherwise than gratifying; and he was further enabled to inform the meeting that building was going on at a very rapid rate, so that they might reasonably look forward to a larger increase in the number of their customers, and consequently to an increase in the revenue. There was only one other subject that he need bring before the notice of the shareholders, and that was the construction of the dock. As they were already aware, the dock was not yet completed, owing to difficulties which had arisen, very much beyond anything that had been calculated upon. When operations had to be conducted in the shape of blasting and excavations under water, the difficulties attendant thereon baffled and defied almost every engineer, and, in the present case, the delay in the completion of the docks arose solely from causes which were only to be overcome by time and patience. But he might inform the meeting that Baron De Mauá had been doing everything in his power to expedite the completion of the docks and the approaches. It had cost the baron a great deal more money than he had ever anticipated, and was likely to involve a still further outlay. But his Excellency was persevering in his endeavours, and was in no sense to blame for the delay. On the contrary, the highest meed of praise was due to him for what he had accomplished in reference to the dock and the entrances, and it was with much personal regret that he (the chairman) had to report that such a burden had fallen upon the baron. He might mention, in connexion with this subject, that the baron had consulted one of the first engineers of the day—Mr. Bateman—who had taken the matter in hand, and the shareholders might therefore rely upon it that everything that was practicable would be done to facilitate the completion of this important work. It would be tedious to attempt to go all through all the figures in the accounts now laid before the meeting, but he could assure them that, in every respect, they presented a satisfactory character. He would only just mention one thing, and that was that during the last half year the consumption of gas was upwards of 5 million cubic feet more than in the corresponding half of the previous year. With these remarks, he moved that the report and accounts be received and adopted.

Mr. YOULE seconded the motion.

The CHAIRMAN, in reply to a shareholder, said the gasholders on the works were in good order; but a new one was required, which must be of considerably larger size than either of the existing holders. This arose from the increasing demand for gas. The question of providing for this necessity was now under the consideration of the directors. The money required for its construction would have to come out of the contingent-fund, which now amounted to £9750. He was glad the question had been put, as it enabled him to remark that one of the omissions in the formation of the company was that they did not provide themselves with a working capital. There ought to have been a reserve of £40,000 or £50,000 to carry on such a business, and the want of it had been a great inconvenience to the directors. The matter would have to be brought formally before the shareholders at a future time, as the board could take no steps in reference to it without their sanction.

The motion was then put and carried.

The CHAIRMAN moved the declaration of the dividend named in the report—viz., at the rate of 16s. per share, free of income-tax, being at the rate of 4 per cent. for the half year ending Dec. 31 last.

Mr. HANCOCK seconded the motion, and said that lately, on returning from Buenos Ayres, he called at Monte Video, and inspected the gas-works. He was pleased to find that they were much too small for the demands that would be made upon the company, and he could assure the meeting that additional capital, either in shares or debentures, would have to be found for necessary extensions. The dock, when finished, would be a most excellent dock, not only for the purpose of unloading the materials required for the works, but also for graving purposes. He thought these were all happy signs for the future, and he looked upon the whole undertaking as in a very flourishing condition, and as having a bright prospect before it.

The CHAIRMAN, in reply to a shareholder who suggested that, in view of the necessity for additional outlay on extensions, the rate of dividend should be reduced, and the £5059 of revenue from the use of the dock for graving purposes should be retained in hand, said it was quite in the power of the meeting to reduce the rate of dividend, if it was generally thought advisable; but he thought the majority of the shareholders would be adverse to such a proposition. Moreover, it was not the usual and proper course of business to apply revenue to capital purposes, and it would be a dangerous precedent to adopt. The last year, as he had stated, was an exceptional year, owing to the high price of coal, but they had good reason for hoping that an improvement in this respect would be visible in the current year's accounts, and, as the business of the company was progressing, there was every prospect of being able to maintain the rate of dividend recommended by the directors. To meet the demand for extensions, they must increase the capital by the issue of a small number of shares, or, which would probably be the more economical course, the issue of bonds to the amount required.

The motion was then put and carried.

On the motion of the CHAIRMAN, seconded by Mr. YOULE, the retiring directors, the Baron de Mauá and Mr. J. L. C. De Salles, were re-elected.

On the motion of Colonel ROBINSON, seconded by Major Dundas, the retiring auditors were re-elected, and their remuneration fixed at 20 guineas each.

Mr. DE SALLES returned thanks for himself and Baron de Mauá on their re-election.

A vote of thanks to the chairman and directors terminated the proceedings.

REDUCTION IN THE PRICE OF GAS.—The Northampton Gaslight Company have just announced a reduction in the price of gas from 5s. to 4s. 6d. per 1000 cubic feet, to take effect from Lady-day last.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Meeting was held on Friday, the 17th inst.—Mr. MAPPIN in the chair.

The following report and statements of account were presented:—

Your board have much pleasure in laying before you their accounts for the half year ending the 31st of December last.

Though such accounts show that it will be necessary to have recourse to the reserve-fund to the extent of £2345 7s. 5d. in order to pay the maximum dividend, your board consider that, taking into account the exceptional state of the coal market and the high price of labour and materials, and the fact that the maximum charge for gas (viz., 3s. 1d. per 1000 cubic feet) has not been altered, the results of the last year's operations are highly satisfactory.

The profits for the half year have amounted to £18,222 3s. 7d.

The dividend recommended by your board will be as under:—On £135,000, class A stock, after the rate of 10 per cent. per annum, £6750; on £209,053 10s., class B stock, after the rate of 10 per cent. per annum, £10,452 13s. 6d.; on 9970 new £10 shares (now fully paid up, but of which £1 per share paid on the 31st of December, 1873, does not participate in this dividend), after the rate of 7½ per cent. per annum, being 6s. 9d. per share, £3364 17s. 6d., making a total dividend of £20,567 11s.

After taking from the reserve-fund the above-mentioned sum of £2345 7s. 5d., that fund will stand at £38,221 7s. 11d.

During the halt year nothing connected with the company's affairs has occurred of sufficient importance to be commented on in this report.

The whole of the existing stock and share capital in the company having been paid up, and the expenditure on capital account leaving that account considerably in debt, your board have convened an extraordinary meeting of the shareholders, to be held after the meeting to which this report will be presented, in order to authorize the creation, under the company's special Act of 1866, of new ordinary £10 shares, to the extent of three such shares for every £100 of paid-up stock or share capital. These shares will be offered to the shareholders in the proportion, as nearly as may be, to the stock and shares held by them respectively; and a call of £2 per share will be made thereon, as the special Act before referred to requires that amount to be paid before such shares can be issued or vest in the shareholders accepting the same.

The extraordinary meeting will also be asked to sanction the conversion into stock (to be called C stock) of the 9970 new ordinary £10 shares, created in 1870, and which are now fully paid up.

Dr. *Capital Account, for the Half Year ending Dec. 31, 1873.* *Cr.*

Class A stock, full paid up	£135,000	0	0	Land, buildings, parliamentary, and other expenses, works, and machinery (including mains to June 30, 1855)	£381,837	8	4
Ditto B ditto ditto	209,053	10	0				
9970 new ordinary £10 shrs., fully paid up	99,700	0	0	Mains from June 30, 1855	60,291	5	0
Amount raised on mortgage	10,400	0	0	Meters	25,251	6	10
Balance	13,226	10	2				
	£467,380	0	2		£467,380	0	2

Revenue Account.

Half year's gas, meter, and other rents, including amount arising from the sale of coke, tar, waste lime, ammonia water, gas fittings, and work done	£85,980	16	1½	Half year's expenditure in the production of gas	£67,255	3	7½
				Paid mortgagees & bankers for interest during the half year	503	8	11
				Balance	18,222	3	7
	£85,980	16	1½		£85,980	16	1½
Balance brought down	£18,222	3	7	Dividends payable May 1, 1874	£20,567	11	0
Deficiency to be taken from reserved fund, May 1, 1874	2,345	7	5				
	£20,567	11	0		£20,567	11	0

Maximum price of gas, 3s. 1d. per 1000 feet.

General Balance.

Balance of revenue account	£18,222	3	7	Balance of capital account	£13,226	10	2
Ledger balances, and accounts owing by the company	51,279	0	4½	Ledger balances, and accounts owing to the company	57,119	17	3½
Balance due to bankers	21,974	3	7	Stores in hand	21,127	4	6
				Balance due from cashier	1	15	7
	£91,475	7	6½		£91,475	7	6½
Reserved fund, invested June 30, 1873					£39,336	19	5½
Amount transferred from revenue, Nov. 1, 1873					388	3	7½
					£39,725	3	1
Interest to Dec. 31, 1873					841	12	3
					£40,566	15	4

The CHAIRMAN, in moving the adoption of the report, observed that it was a pleasant duty to be able to congratulate the shareholders on the satisfactory state of their affairs. It was an occasion for special congratulation, considering the times through which they had passed during the last year. Coal was the chief article required in the manufacture of gas, and, bearing in mind the high prices which coalowners had been able to obtain for it, it must be a source of great satisfaction, not only to the company, but to consumers, that the price of gas (3s. 1d.) had not been increased. To accomplish this result, it was evident the affairs of the company must have been well managed. The last few months had been a period of great anxiety to the shareholders in reference to the course they should pursue in making contracts for coal. They had entered into considerable contracts, but they left a wide margin to buy in the open market, thinking it was better to do that, even if they had to pay a few shillings a ton more, than to bind themselves by contract for the whole of their supply. This arrangement had turned out most satisfactorily in its results, for the directors had been able to purchase coal in the open market at considerably less than some of the contracts which they entered into. He was glad to say that all their contracts had now expired, with the exception of one for the supply of cannel, and that they were now buying in the open market at very considerably reduced prices. He believed he might hold out the hope that during the remainder of their lives coal would not again reach the figure at which it had been quoted during the year. It was the opinion of many engaged in the trade that inasmuch as recent high prices had induced capitalists to open up numbers of new collieries, the increased supply thus created would keep prices in future within something like moderate bounds. The expenditure on capital account had not been very large, not more than £17,000, as they thought it wise to be as economical as possible. The shareholders would now be asked to create new shares. Hitherto the directors preferred paying interest to their bankers upon borrowed capital than pay a large dividend on new shares, as they would then have to draw more largely on their reserve-fund than they would have to do this half year. But it was now deemed expedient to create new shares. In conclusion, he observed that the engineer of the company had assured the directors the works were in an efficient state, and said it was important above everything to keep them in a high state of efficiency, so as to prevent breakage.

Mr. C. BRANSON briefly seconded the motion.

Mr. W. SISSONS considered the chairman might have congratulated the company on the fact that all the new schemes for making gas had utterly failed, or were fast doing so. The Sheffield Gas Company had also provided gas without raising the price, while in many other places the price had been considerably raised. Such things as these, he thought, ought to cause them great congratulation.

The resolution was then put to the vote and carried unanimously.

The CHAIRMAN then moved that a dividend of 10 per cent. be paid on the A and B stock, and a dividend of £7 10s. on the amount paid upon the new £10 shares, to be payable on the 1st of May. In the course of a few remarks he

explained that the dividend would not all accrue from the profits, for he regretted that they had been compelled to draw upon the reserve-fund to the extent of £2243.

Mr. G. WILSON seconded the motion, which was carried.

The meeting was then made special, for the purpose of creating new capital.

The CHAIRMAN moved a resolution to the effect that 13,312 new ordinary shares of £10 each be created and issued, the same being part of the sum of £350,000 authorized to be raised under the companies Act of 1866.

Mr. T. WATERHOUSE, in seconding the motion, complimented the directors on the satisfactory manner in which they performed their work. He believed there was no town that had been better supplied with gas during the last twelve months than Sheffield had.

Mr. W. SISSONS wished it to be made known that the new shares would bear interest at the rate of 7½ per cent.

In answer to Mr. Smith, the CHAIRMAN explained that the first call would be made on the 30th of June, but when the remainder would be made he did not know.

The motion was then carried.

It was resolved, on the motion of the CHAIRMAN, seconded by Mr. J. H. WATERHOUSE, that the £10 shares which were created at an extraordinary meeting in 1870, should be consolidated, and in future be known as class C stock.

A vote of thanks to the chairman concluded the proceedings.

SHEFFIELD WATER-WORKS COMPANY.

The Ordinary General Meeting of Shareholders was held on the 20th inst.—Mr. G. MARPLES in the chair.

The following are the principal paragraphs in the directors report:—

After payment of all expenses of the company, interest on debentures, the sum of £24,998 12s. 6d. for dividends on preference shares, and £9000 for the dividend paid in last November on the ordinary capital of £450,000, there remains the balance of revenue account, £13,316 3s. 5d. The directors recommend that out of this sum £9000 be applied to a dividend, payable on the 1st of May next, for the half year ending the 31st of December last, making with that paid on the 1st of November last, 4 per cent. for the year, free from income-tax, which tax on the two half years dividends amounts to £243 15. After these operations there will remain an undivided balance of revenue of £4316 3s. 5d., which the directors suggest shall be carried forward to next year's account.

Although the rainfall of the past year was very much below the average, the directors are glad to be able to report that not only was a constant supply of water maintained for the company's district throughout the year, but there was always a large reserve in the storeage reservoirs now in use. This fact proves not only that the existing works are amply sufficient for present demands, but also that when those works are supplemented by those now in progress, the ability of the company to supply a largely increased population, even in times of exceptional drought, will have been placed beyond question. The company during the past year laid pipes to the extent of nearly six miles. The entire length of the pipes is now 179 miles. The pipes thus laid include a main of large calibre from the Old Great Dam, at Crookesmoor, to Sheffield Park. This main will materially improve the supply of water to an important portion of the town.

The following is the report from Mr. Hawksley, the engineer-in-chief:—

"30, *Great George, Street, Westminster, S.W., April* 6, 1874.

"Gentlemen,—We have examined all the reservoirs of the company now in use, and have the pleasure to report that they are all in excellent condition. The Dale Dike embankment is rapidly advancing towards completion, and will, we anticipate, be ready for the reception of water in or before October next. The progress of the Damflask embankment has been somewhat retarded by the necessity for keeping a large force of workmen at Dale Dike, but it is now about to be proceeded with more rapidly, and will, we have no doubt, be finished by the end of the summer of 1875. By the aid of these two additional reservoirs the company will become able to supply the increase of the town and neighbourhood of Sheffield for a long term of years.—We have the honour to be, gentlemen, your most obedient servants,

"T. AND C. HAWKSLEY.

"To the Directors of the Sheffield Water-Works Company."

The additional house property to which water has been laid on during the last year will produce, when occupied, £1089 1s. 3d. The company now supplies with water 51,200 houses, besides other property. This number of houses is an increase of 1000 on that of the previous year. The demand for water for manufacturing and other similar purposes is steadily increasing. The directors consider this increase as peculiarly satisfactory, because in their opinion it indicates that manufacturers are beginning to appreciate more than they formerly did the advantages for manufacturing uses of the pure water afforded by the company's works, and the great convenience for such purposes of the constancy of the supply. The directors believe that a regular and important increase to the company's revenue may be relied upon from this source.

Shareholders will observe that notwithstanding the increase, both in the number of houses supplied and in the quantity of water used for trade purposes, the total income derived from water-rates appears by the annexed accounts to be less than it was in 1872. This diminution does not, however, actually exist, but, on the contrary, the aggregate water-rates have considerably increased. The apparent diminution arises from the fact that the revenue of the first half of the year has been charged with the great bulk of the deductions for a year and a quarter, consequent upon the judgments in the case of the company *v.* Bennett, respecting the basis of assessment for the smaller class of houses. The majority of the cases affected by those judgments have been satisfactorily arranged, and consequently any future deductions in respect of past rates will be comparatively trifling.

The accounts show that the rates for the latter half of the year, assessed in accordance with the decision in Bennett's case, amount to £26,806 8s. 7d., being equal to £53,612 17s. 2d. per annum. The latter sum exceeds the rates of 1872, which were assessed on the old basis, by £1673 6s. 1d. It is, therefore, obvious that although those judgments were important, there is nothing in their effects which will, in the opinion of the board, interfere with the substantial prosperity of the company.

The Town Trustees of Sheffield entered some months ago into negotiation with the company for the purchase of part of the land at Crookesmoor, with the object, as the directors understood, of devoting a portion of it to the purpose of a public park or recreation ground. The directors would have gladly aided this project, but it appeared that not only were the reservations which the company's engineer-in-chief advised to be essential for the company's works found to be incompatible with the plans of the Town Trustees, but they made stipulations on their part which, with reference to the future use of the Old Great Dam, were inadmissible. The Town Trustees, therefore, withdrew from the negotiation.

The directors regret that, owing to private reasons, the late chairman of the company, Mr. William Cockayne, retired from the board. The directors desire to place upon record their sense of the value of the services rendered to the company during many years by Mr. Cockayne. By his retirement the company has lost a most efficient director. The place of Mr. Cockayne, both as director and as chairman, was filled by the election of Mr. George Marples.

The shareholders are no doubt aware that Mr. Waterfall, the late managing director, died on the 15th of last month. Mr. Waterfall had been 24 years on the direction of the company, and since 1864 he had filled the post of managing director. To his intelligence, judgment, and indefatigable energy the company owed in a great measure its extrication from the difficulties of past years, and those qualities, combined with the intimate knowledge he had gained of the company's business, made his assistance and superintendence of the utmost value. The directors do not recommend the continuance of the office of managing director. If re-elected, the members of the present board are, under the existing circumstances of the company, willing to give their services gratuitously as they have hitherto done, provided, of course, they can secure efficient assistance. The shareholders will therefore be at liberty to rescind the existing resolution for the payment for direction of £1000 a year, the sum which, by arrangement made when Mr. Waterfall became managing director, has been annually paid over to him. It will, however, be obvious to the shareholders that the directors cannot engage personally to manage in detail the important and ever-increasing affairs of the company, and that they must be aided by some one engaged specially for the purpose, who can devote the whole of his time to it, and who will not only be able, under the general control of the board, to conduct the financial business of the company, and supervise all details, but who will be competent, when he has gained experience, to advise the directors, as Mr. Waterfall did, upon all the various matters which come before them. The directors consider that a gentleman in the position of a general manager would best meet the requirements of the company. They have made some inquiries on the subject which they believe will not be fruitless. It is scarcely necessary to add that the directors do not contemplate that a general manager should have any responsibility in connexion with the works confided to the engineer-in-chief of the company. The vacancy in the directorship caused by the death of Mr. Waterfall has not been filled up. The present directors recommend for election Mr. Frederick Bardwell of Claremont Place, Sheffield, who has consented to be put in nomination.

The vigorous progress of the works of the company renders it necessary to raise funds in addition to those now at the company's command. The directors believe that the interest of the company will be best promoted by creating, under the powers of the Sheffield Water (New Works) Act, 1867, such new shares as will enable further part of the borrowing powers conferred by the same Act to be exercised. The shareholders will have observed by the advertisement that a special meeting of the company will be held immediately after the termination of the business of the general meeting, for the consideration of the creation of these new shares, and with this report each shareholder will receive a circular detailing the plan which the directors will propose to the shareholders with that object.

The CHAIRMAN briefly moved, and Mr. S. ROBERTS seconded, the adoption of the report.

Mr. GREAVES alluded to the second paragraph in the report, which affirmed that, although the rainfall of the past year had been very much below the average, the directors were glad to be able to report that a constant supply of water had been maintained throughout the company's district during the past year. He had noticed frequently in the local newspapers that when fires occurred the brigade could not procure water to extinguish them. It seemed to him that there could not be a constant supply while these complaints were being continually made. He referred particularly to the report of a fire which took place about last November in Sycamore Street, when it was stated that there was no water in the mains at all, and the brigade had to obtain it from a private source. It was apparent that there was fault somewhere, and if the company were not to blame, it was only fair an explanation should be made. He also desired to know which quarters in the accounts had been taken off as regarded the decision in the Bennett case, which he thought a matter of considerable importance. He was of the opinion that the report scarcely described the matter in as favourable a way as it ought to do, for he considered there would be between three and four thousand pounds accrue to the company which were omitted in the report.

Mr. AYRIS, the company's engineer, explained that during the year there had only been one complaint of shortness of water, and that was on the night of the fire in Sycamore Street. On that occasion they had been laying mains from the Park to the old Godfrey dam, and had connected the pipes at the junction of Gell Street and Glossop Road. Before the connexion could be made it became necessary to take the water out of the mains, and that was the cause of the failure in the supply on the occasion in question. He gave particulars as to certain instructions he gave the chief constable and the superintendent of the fire brigade in reference to the supply being off the night the fire occurred.

Mr. EADON said the matter was satisfactorily explained in the newspapers a few days after the fire occurred.

The CHAIRMAN said, in reference to Mr. Greaves's second question, the directors did not wish to colour the matter too highly. They thought they had placed it fairly before the shareholders, and hoped they were satisfied. He should be glad to find that they would have £4000 more than was stated in the report.

Mr. GREAVES wished to know which were the quarters taken off.

The CHAIRMAN replied that they could not deal with the question until after the decision of the judges in the Court of Error was given, and, therefore, it was the five quarters running from March, 1872, to June, 1873.

Mr. GREAVES understood, then, that of the five quarters taken off, three belonged to 1872 and two to 1873.

The CHAIRMAN replied that that was so.

Alderman MOORE inquired whether the directors had made up their minds to make no deductions beyond the five quarters mentioned.

The CHAIRMAN replied that there were certain consumers who were in arrears, and, unfortunately, some of them happened to owe more than five quarters rent, and contended that they should have deductions for as many quarters as they were in arrears. The question was one which had occupied the attention of the board. Some of the cases had been settled, and he had no doubt the remaining portion of them would also be settled at a very little further loss to the company. Whether they allowed six, seven, or ten quarters would depend upon the circumstances of each isolated case.

Alderman MOORE supposed the directors intended to settle with their tenants the best way they could.

The CHAIRMAN replied that that was their intention, and they hoped that when the questions arising out of the Bennett case had been finally settled, they, as a company, would be able to extend the right hand of friendship to the town, and be better friends in future.

Alderman MOORE was glad the company had decided on such a sensible course. There was, however, another question upon which he required information. There appeared to be about £15,000 paid as interest on unproductive capital. What did it include? Did it include the money expended on the Strines dam?

The CHAIRMAN answered in the affirmative.

Alderman MOORE wished to know whether the Strines dam was full, and, if so, whether it was utilized.

The CHAIRMAN replied that the dam was full, but it had not yet been utilized.

Alderman MOORE: How long is it going to be kept in that state?

The CHAIRMAN answered that it depended entirely on the circumstances of the company. As yet there had been no necessity for them to utilize it, and surely Mr. Moore would not have them use it merely for the sake of having it in use.

Alderman MOORE intimated that the reservoir would be utilized if the directors did not want the interest for dividend.

The CHAIRMAN indignantly denied that such was the case. The company were now in a position to give the town a constant supply of water, not only at the present time, but for years to come. When there were no complaints of the scarcity of water, he did not think any advantage would accrue to the town if the reservoir were brought into immediate use.

Alderman MOORE contended that that showed the dam was unnecessary, and ought not to have been made.

The CHAIRMAN protested that the reservoir was necessary. Certainly, if they confined the wants of the town to the present day, the new dams were not required; but the company had thought of what the wants would be a few years hence. Ten years hence all their reservoirs would be needed.

Alderman MOORE wished the company had looked ahead 20 years ago.

The CHAIRMAN considered it was never too late to mend.

Mr. HIDES inquired whether the company were not compelled by Act of Parliament to complete the reservoirs within a limited period?

The CHAIRMAN regretted that they were. It had proved a misfortune that they had had so little time to perform their work in.

Alderman MOORE wished to know if the company were justified in charging 8s. 11½d. water-rent for a cottage under £7 per annum?

The CHAIRMAN replied he could give no definite answer to the question. The company at present considered they were entitled to charge 8s. 11½d., but there was, of course, a diversity of opinion on the matter.

The motion was then put and carried, and a dividend of 4 per cent. per annum, for the year ending the 31st of December last, was declared, to be payable on the 1st of May.

The CHAIRMAN said that on the 30th of August, 1864, a resolution was passed empowering the directors to pay a sum of £1000 "for directions." In consequence of the death of their late managing director, it would be necessary to rescind that resolution, inasmuch as the directors had decided to give their services gratuitously, provided that efficient assistance was given them. It was proposed, therefore, that the £1000 should be paid as salary henceforward, and not as previously. He moved a motion to that effect.

Mr. HENRY UNWIN seconded the motion, which was carried.

A vote of thanks having been given to the board for their past services, the retiring directors were re-elected, and Mr. Bardwell was appointed a director in the room of the late Mr. Waterfall.

This concluded the business of the ordinary meeting, and an extraordinary meeting was then held for the creation and issue of new preference shares to raise the sum of £180,000, part of the sum of £500,000 authorized to be raised by the Sheffield Water (New Works) Act, 1867.

The CHAIRMAN moved—"That all the proposed resolutions annexed to the chairman's circular letter of the 13th of April last, relative to the question of the creation and issue of new preference shares, to be called E shares, shall be and are hereby adopted."

Mr. J. W. HAWKSLEY seconded the motion, which, after some remarks by Alderman MOORE, was put and carried, and the proceedings terminated with a vote of thanks to the chairman.

FATAL ACCIDENT AT THE DUBLIN GAS-WORKS.

On Thursday morning last, about half-past eleven o'clock, an accident of a very serious character occurred at the Great Brunswick Street works of the Alliance and Dublin Consumers Gas Company. We learn from the *Irish Times* that at that time the roof of what has been called the new retort-house, a building of several hundred feet long, and of a considerable height and width, came down in one terrific fall, presenting in its utter destruction a picture of ruin, such as cannot be seen except in connexion with great catastrophes. A providential warning—a crackling report—of scarcely more duration than half a minute, allowed about 30 men, including Mr. Waterfield, the engineer, who were on the floor of the retort-house, to make their escape into the archways of the retort-beds, and to this circumstance they owe it that they were not buried in the *débris* of the fallen roof. The retort-house was built about seven years ago, when the works were the property of the Hibernian Gas Company, and it is said that recently the roof gave indications of its instability, so much so that the directors of the Alliance Gas Company had determined on having it stayed up. On Thursday last four men named Frank Brien, of Lime Street; John Murray, of Sandyford Avenue; John Robinson, of Clarence Street; and John Mullins were employed working on the roof; but for them the warning which reached the men beneath was of no avail. There was no escape, nothing to stay their descent, and down they came with the insecure roof, whose fall would have crushed every living being below but for the brief warning which the men there received. One man named John Robinson was so seriously injured that he died in the course of the afternoon. He and his companions, Brien and Murray, were promptly conveyed to Sir Patrick Dun's Hospital, where they received every attention from the medical gentlemen connected with the institution. Some of Robinson's ribs were broken, his chest crushed in, and his thigh and leg broken. Another man named Francis Brien sustained internal injury and a cut over the right eye. Murray received some cuts on the head and hands, but neither in his case nor in that of Brien is there any apprehension of a fatal result. Mullins was the least injured. He was cut on the forehead, and the wound was dressed at the hospital, but it was not considered necessary to detain him. The injured men were attended by Dr. Barton, resident surgeon, and Mr. Abraham Blunden, student, and subsequently by Dr. Bennett. Mr. Drimmie, one of the directors of the gas company, and Mr. Thomas Cotton, acting secretary, attended at the hospital. Mr. Drimmie, on the part of the company, expressed a wish that the best attention should be given to the men, and if necessary at the expense of the company; but independently of this, the men would be certain to receive in such an institution all the aid that medical science can afford. The damage involved by the fall of the roof may be estimated at perhaps not less than £1500 or £2000. A large portion of the machinery, consisting of hydraulic and other gas mains, &c., has been destroyed. It is stated that the retort-house had not been used since last November. The men who were employed at the time the roof fell were bricklayers who were engaged executing repairs. It would have been a most disastrous event had the work of gas manufacture at the retort-house been in operation. The unfortunate sufferers were, it is stated, engaged in attaching spurs to strengthen the weak part of the roof. The iron rafters were not more than three quarters of an inch thick, and some men of experience in building are of opinion that they were not of a strength to bear the great weight of material which they were intended to support. Binders were placed between the walls supporting the roof, and some of these snapped; but what was the cause which led to the falling of the roof must be ascertained only after careful inquiry. It may, however, be stated that some years since the high wall facing Brunswick Street cracked, and it became necessary to prop it up till it was secured with binders. The retort-house is about 340 feet in length, and the roof from wall to wall was about 40 feet. The operations of the company will not be interefered with by the accident, but the direct loss sustained is very considerable.

CORONER'S INQUEST.

The coroner's inquest on the body of the unfortunate man Robinson was held by Dr. W. White, the city coroner, on Friday.

Mr. P. MARTIN appeared for the gas company, and Mr. CANE, a solicitor, for the widow of the deceased.

The jury having viewed the body, *Ann Robertson*, the widow, identified it as that of her deceased husband.

Henry Simpson, of 2, Prince William Terrace, stated that he was a constructor of ironwork generally; he had been four years in the employment of the Alliance Gas Company. About half-past eleven on the previous morning he was working at the retort-house, and was standing under the roof; he heard a great noise, accompanied by a large quantity of smoke and dust; when the dust cleared away, he saw that the roof had fallen. The deceased man, with two others, had been engaged upon the roof—they were placing "stays" on the roof, to prevent it from falling, as it showed signs of giving way. Witness saw the three men fall with the roof; they were taken up and conveyed to the hospital. The repairs of the retort-house were being carried out under the direction of witness; there was no contractor or builder employed.

The CORONER: How long is it since this roof was noticed to be in a bad state?

Witness: About three weeks ago, and since then we have been trying to repair it in sections. About a month ago a bulging of the wall was discovered, and in less than a week we commenced the repairs. The deceased was a sober man, and a good workman.

By the JURY: I would not have sent them up on the roof if I had not considered that they would have been safe there.

The CORONER: Had your presence been necessary with them on the occasion, would you have hesitated to go upon the roof.

Witness: Not in the least. I have been on the roof with them for the last three weeks, off and on.

By the FOREMAN: From the time we first perceived the state of the wall I observed that it was being drawn a little.

Mr. CANE asked the witness whether, as the building was giving signs of coming down, it was not the duty of the company to have got the services of an experienced architect.

The CORONER: That is a matter of opinion which would not be evidence.

The FOREMAN: Was not the roof getting worse every day?

Witness: On Wednesday we thought it was getting a little worse. On Thursday morning the men did not get on the roof until about five minutes before the accident happened. We had made it secure as far as we could. Just before the accident happened I was speaking to Robertson about sending up some extra spurs. Robertson lowered down a rope through a hole in the roof. I was about to fasten the end of the rope to what was going to be hauled up, but, instead of doing so, went aside to speak to Mr. Waterfield, and then heard the noise, and found myself enveloped in smoke. I had had the deceased in my employment for the last 12 years. I have been engaged at ironwork for 27 years. Robertson was also an ironworker, and was a competent man. In my opinion the wall was not strong enough, for the roof was pushing it out; we made an inspection that morning before the men were sent on the roof.

To Mr. MARTIN: From my position I consider I was in even greater danger than the men on the roof, for I was under it. I do not know how I escaped. The repairs were stopped some days ago in consequence of the high winds.

Mr. CANE: When it was discovered that the building was in this state, did the company send any one to the place, or were you directed to take the management of the repairs?

Witness: Mr. Waterfield directed me to superintend the work. I was on the roof all Wednesday up to four o'clock.

Mr. *Edwin Waterfield*, 57, Beech Hill, stated that he was a gas engineer, in the employment of the Alliance and Consumers Gas Company. He was standing underneath the roof at the time it came down, and had to jump out of the way of the falling materials in order to save himself. The evening before the occurrence he had walked up the stage, and examined everything. On Thursday morning he also did do. It was inspected every day.

A JUROR: Was it getting worse every day?

Witness: Nothing that you could perceive from the stage.

By a JUROR: The retorts under this shed had been out of use since last December. It was intended to reset them. When the state of the roof was discovered a month ago, I reported the matter to the board, and they directed me to put the repairs in hand at once; the only delay we received in the works was caused by the high winds.

Dr. *John Barton*, resident medical officer of the hospital, deposed that the deceased was admitted about twelve o'clock, and died, about three p.m., of the injuries he had sustained.

The coroner, jury, and professional gentlemen then proceeded to the scene of the occurrence at the gas-works in Brunswick Street, and inspected the retort-house, fallen *débris*, &c. They then reassembled in a room at the gas-works.

Mr. CANE (to last witness): Was the opinion of an architect taken with regard to these repairs previous to their being undertaken?

Witness: There was not.

Mr. MARTIN: Did you observe that it was the buckling of the iron that caused the roof to come down?

Witness: I consider that it was the buckling of the iron principals of the roof, and nothing but that.

The witness was asked by counsel to explain what he meant by "buckling," and said that when the iron rafters or "principals" were bent or "crookened," they became shortened, and the ends of them were drawn off the walls. Chains were run through them from end to end to keep them from running.

The FOREMAN: What was the immediate cause of the buckling?

Witness: The continuous strain, brought on by the high winds.

To another JUROR: It was the buckling of the ironwork that caused the deviation of the walls.

Mr. MARTIN: Did you observe the walls; were they secure?

Witness: They were. The parapet did not come down; we took it down. There was nothing whatever in the appearance of the roof to indicate that an architect was necessary. Simpson had had more experience of iron roofing than any architect in the city. He had erected a large gasholder, and after doing that was taken into the service of the company.

Mr. MARTIN: Were there any matters requiring to be done that struck you except matters connected with the ironwork?

Witness: None whatever.

Mr. CANE submitted that sufficient means had not been taken by the company to protect the lives of their servants. Before a building of that size was tampered with, it ought to have been inspected by a competent architect.

Mr. MARTIN, on behalf of the company, said they had afforded the fullest possible opportunities for the investigation of the matter. The evidence showed that all reasonable precautions had been taken by the company, and that there had been no occasion for calling in architects or taking the repairs of the roof out of the hands of their skilled and trusted officers. The retort-house was constructed by an eminent firm, and the citizens had never blamed the gas company for being too low in their estimates, but rather for having been sometimes extravagant.

Witness, in reply to a juror, stated that he had been on the roof with the men many a time.

In reply to the coroner, *witness* stated that this retort-house was not used since December last, because the retorts in it were not wanted.

The jury, after a quarter of an hour's deliberation, presented the following verdict:—"We find that John Robertson died on Thursday, the 23rd of April, from several fractures and other injuries, received by him on the same day, through the falling of the roof of the retort-house of the Alliance and Consumers Gas Company, at Brunswick Street. And we find that there was not proper precaution taken on the part of the company for the carrying out of the repairs necessary for said building, there not having been proper consultation before the work was commenced."

Mr. MARTIN: Mr. Church, the eminent gas engineer, inspected the roof. As the case had been put upon the question of inspection by an architect, I did not think it necessary to give that in evidence.

The CORONER: The jury have agreed to their verdict.

Mr. MARTIN: It would be right that the jury should have the fact I have just mentioned in evidence.

A JUROR: We should.

Witness, in reply to the coroner, stated that some time in February last Mr. Church inspected the roof, and he went with him.

The CORONER said he would add that evidence to the depositions.

This closed the proceedings.

The two other men who received injuries by the fall of the roof are progressing favourably in the hospital.

THE PROPOSED TRANSFER OF THE BIRMINGHAM GAS-WORKS TO THE CORPORATION.

MEETING OF THE TOWN COUNCIL.

A Special Meeting was held on the 21st inst.—the MAYOR presiding.

Alderman HAWKES read a report from the General Purposes Committee, which referred to the action that had been taken by the council in connexion with the purchase of the two gas companies, gave the result of the ratepayers meeting in the town-hall, and of the polling, and mentioned that the agreements with the two gas companies for the sale and purchase of their undertakings had been duly engrossed in duplicate, and the seals of the respective companies and the corporate common seal affixed thereto. The committee were now in communication with the Birmingham and Staffordshire Gaslight Company, for the purpose, if possible, of arranging terms for the redemption of annuities, in accordance with the instructions of the council. The committee now recommended that, for the purpose of obtaining the confirmation by Parliament of the said agreements, and for effecting and completing the purchase and transfer of the undertakings of the said companies to the corporation, they be authorized and empowered to adopt and present such petitions,

retain, engage, and employ such counsel, agents, witnesses, and other persons, appoint such deputations to attend in London and take charge of the proceedings in Parliament, and do all acts, matters, and things in the name and on behalf of the council, and under the corporate common seal, as they may deem necessary or advisable. The committee also recommended that they be authorized to adopt all such measures as they may deem necessary for obtaining the insertion of clauses and amendments in the Birmingham Gaslight and Coke Company's bill now before Parliament, first submitting the same to the council for approval. In moving the adoption of the recommendations of the committee, he said that there was a bill in the House of Commons, promoted by the Birmingham Gas Company, against which the council would have to formally file a petition, in order to obtain a *locus standi*. The council must then take advantage of the opportunity to induce Parliament to confirm the agreement between the corporation and the gas companies, for the purchase of the works, this session, instead of the matter being postponed to the session of 1875. This, however, could only be done by the Houses of Parliament agreeing that their Standing Orders with reference to private bills should in this case be suspended. Under counsel's advice, the committee and the companies thought that Parliament might waive its Standing Orders; and, if this were done, a great deal of expense would be saved, and, what was much more important still, the corporation would come into actual possession of the property a year earlier than would be the case if they had to become suitors for the bill in 1875. Supposing the committee had the good fortune to succeed in inducing Parliament to pass the bill this session, it must be understood that it would be, to all intents and purposes, a new bill, and their bill, and therefore the Town Council would be entitled fully to investigate its provisions and clauses, as though it were an original bill. He thought, when the council heard what clauses the committee would advise to be allowed to insert, that many of the difficulties which had been suggested would at once be removed, and the transaction would appear as capable of accomplishment by Birmingham as it had proved in other places.

Mr. PEYTON seconded the motion.

In the course of the discussion which followed, Alderman BRINSLEY called attention to the very small number of persons who had voted on the recent poll being taken, and asked whether it would be possible to ascertain the number of shareholders of the gas companies who had polled. He asked this because he had obtained possession of a circular letter from Mr. Sharp, addressed to the shareholders of the Staffordshire Company, urging them to vote in favour of the proposed transfer. He should be glad to know whether the General Purposes Committee would give to Parliament the number of persons who polled in favour of the purchase of the gas undertakings; and, if so, the number of disinterested ratepayers who did so. He was told that a somewhat similar letter had been issued by the Birmingham Gas Company. He thought that Parliament would like to see whether the ratepayers were anxious for the purchase to be completed.

Mr. TAYLOR said he could not say that it was in good taste for the companies to send round a letter like that. It was, however, certain that the shareholders did not concur with the writer of the letter to any extent, or ten times the number of votes would have been given. A shareholder had told him the other day not to think that all the gas shareholders were anxious for the purchase to take place, because it was not the case.

The MAYOR said he had never seen the circular which Alderman Brinsley had read, but he had heard of it. He, however, could explain it in this way. The solicitors to the gas companies felt this obligation: "We have made a bargain with the corporation, and, be it good or bad, we are bound to endeavour to get it carried." It was on these grounds that they issued the circulars. He could only say that he knew that some directors of the companies and some large shareholders went and voted against the resolution.

Alderman SADLER asked the town-clerk whether, in the event of the transfer, any proceeds arising from the sale of gas would go to the borough rate or the borough improvement rate.

The TOWN CLERK said he believed that it was the intention of the committee that the profits should go in aid of the borough rates, but the clauses of the Act were to come before the council, and the council would have to decide upon that when they were discussed.

Alderman SADLER wished to know whether the profits at the present time would legally go the borough rate or the improvement rate.

The TOWN-CLERK said it would depend entirely upon the terms of the transfer—the conditions of the Act transferring the gas-works. In most instances, from the Acts he had consulted, the borough fund had been the fund.

The motion was carried, with one dissentient, and it was resolved to suspend a resolution previously agreed to authorizing the Public Works Committee to petition against the bill of the Birmingham Company.

DEPUTATION FROM THE TOWNSHIPS.

On the 18th inst., a deputation waited upon the mayor and chairman of the General Purposes Committee of Birmingham from the West Bromwich Commissioners, Darlaston Local Board, Harborne Local Board, Wednesbury Local Board, Smethwick Local Board, Tipton Local Board, and Handsworth Lighting Authority, for the purpose of making a representation relative to the acquirement of the Birmingham and Staffordshire Gas-Works by the corporation. Mr. Bennett, chairman of the West Bromwich Commissioners, explained the object of the deputation by reading a note of the views of the parties represented, and their desire that their districts represented should have the option of purchasing so much of the undertaking of the Birmingham and Staffordshire Gas Company as supplies those districts; the purchase to be made on the principle of a payment for that portion of the undertaking proportionate to the payment for the whole by the corporation. Failing such arrangement, the districts represented would strenuously oppose the proposed amendment of the Birmingham Gas Bill now before Parliament. The mayor stated that he was unable to assure the deputation that the council would consent to this application, as they had been advised that the retention of the West Bromwich works was essential to the efficient supply of Birmingham. In the event, however, of further examination showing such retention to be unnecessary, the corporation would doubtlessly favourably view the application. In the meantime, the corporation would be willing to guarantee that the districts represented by the deputation should not be prejudiced by the transfer, and that the consumers should be supplied on terms at least as favourable as those they would have obtained had the undertaking continued in the hands of the Birmingham and Staffordshire Company.

WEDNESBURY LOCAL BOARD.

At the meeting of this board on the 20th inst.—Mr. R. Williams presiding—the chairman, as one of the deputation sent from this board to the conference of representatives of towns interested in the proposed transfer of gas-works to the Birmingham Town Council, reported the resolutions come to at the conference, and the result of the interview with the mayor of Birmingham. He then went on to say that the transfer, if carried out, must affect the whole of the confederated towns for the better or the worse—for the worse, he believed. The Corporation of Birmingham had agreed to buy the plant of the two companies at a sum which, capitalized, would pay a dividend of 10 per cent. in perpetuity, the total sum being above a million and a quarter of money. The shareholders in the company were naturally very anxious to sell on these terms, and for some reason the corporation were very anxious to buy, and were desirous of pushing the matter forward with a rapidity which gave the authorities of the affected towns no opportunity of looking carefully into the subject. It should not be overlooked, however, that none of the gas manufactured at the Swan Village works of the Birmingham and Staffordshire Company went into Birmingham, all of it being distributed in those towns represented at the conference. The question then rose, why was Birmingham so anxious to buy, and the suspicion naturally arose that there must be some ulterior design. It appeared from the discussion that one design was to manufacture gas for Birmingham at Swan Village, so that those works would have to be extended, or the Black Country towns would have to go short. The representatives of those towns said they would rather be in the hands of a private company than of the corporation, especially as such a high price was to be given for the works; and if the companies sold at all, they should sell to those towns which had been their customers. He would not advise the district to buy the Swan Village works at the price which the Birmingham Corporation proposed to give for them, or they would be made to pay heavily for the advantage of Birmingham. Approximately, the cost of the works of the two companies would be a million and a half, and the mayor said that if the confederated towns bought the Swan Village works, they would have to pay something like three-quarters of a million for them. That was a wonderful sum. But, taking it at half a million, he found that that about equalled the rateable value of the eight towns represented at the conference. Therefore, dividing that among the towns according to their rateable value, Wednesbury would have to pay a little over £70,000, and he did not think they were prepared to pay such a sum. Capitalized at 4 per cent., it would saddle them with £2800 a year, being more than half the rates they paid last year, and would involve a rate of 1s. in the pound. He therefore advised the board to go no further than for a *locus standi* to oppose the bill, while they turned round and considered the whole bearings of the question, and not to take part in any promise to purchase, because, as a matter of expediency or economy, they might feel disposed to establish works of their own. In conclusion; he proposed that the necessary steps be taken to give the board a *locus standi*, in conjunction with the other lighting authorities of the district, to oppose the sale of the Swan Village works to the Birmingham Corporation. Mr. Marsh, the other representive of the board at the conference, seconded the proposition, which, after a short conversation, was unanimously agreed to.

PUBLIC MEETING OF GAS CONSUMERS.

A largely attended meeting of gas consumers was held at the Queen's Hotel on the 21st inst., when the following resolution was adopted—"That in the bill for the transfer to the corporation of the properties and powers of the gas companies, provisions should be introduced for the following purposes, namely—1. To limit the amount of profits to be carried to the corporation. 2. To require charges for gas to be made at a differential rate with reference to the amount consumed. 3. To require the quality of the gas to be equal to not less than 16 candles. 4. To give the consumers a voice in the management of the works, and to constitute an authority for deciding all questions between consumers and the corporation with reference to the foregoing objects." A committee was appointed to carry the resolution into effect.

WALSALL IMPROVEMENT COMMISSIONERS.

A special meeting of the commissioners was held on the 22nd inst.—Mr. Beddal in the chair—when the clerk read the draft of a petition which he had prepared against the introduction of the purchase clauses into the Birmingham Gas Bill. It recited that the Walsall Corporation has, ever since 1824, possessed gas-works of their own, upon which they have spent nearly £50,000, and were supplying gas at a price considerably lower than the Birmingham and Staffordshire Gaslight Company, who have mains in the town, and, consequently, are competitors of the commissioners. The maximum price charged by the commissioners is 2s. 5d. per 1000 cubic feet, whilst the maximum price charged by the Birmingham Company in Birmingham and eight or nine other parishes in the neighbourhood was 3s. 6d., subject to a discount of 5 per cent. for prompt payment. The price of gas manufactured by the commissioners, and the reduction they compel the Birmingham Company to make in order to compete with the commissioners, saves the ratepayers £4000 per year, which was equal to a rate of 1s. 6d. in the pound on all the assessable property in the district. The petition then points out that Bloxwich, Harden, and other parts of the borough, are not in the limits of the area supplied with gas by the commissioners, and the strange anomaly exists that the residents in those parts of the borough have to pay 30 per cent. more for the company's gas than those who reside within the limits of the commissioners area, where the company supply gas at the same rate as the local body. The petition concludes by praying the House to enable the petitioners to secure the insertion of clauses in the bill to make it compulsory upon the Corporation of Birmingham to sell on equitable terms to the commissioners, at any time they may require within a fixed period, the whole of the works, property, and plant of the Birmingham and Staffordshire Gaslight Company within the borough and parish of Walsall, and of such other clauses as the commissioners may be advised are necessary. The petition was agreed to.

The Smethwick Local Board and the Oldbury Local Board, at special meetings held last week, also resolved to oppose the introduction of the clauses; and at public meetings of the owners and occupiers at Walsall and Smethwick, the action of the commissioners and local board in reference to the bill has been approved.

ON THE ECONOMICAL COMBUSTION OF COAL GAS.

By Dr. W. WALLACE, F.R.S.E., F.C.S.

[Read before the Philosophical Society of Glasgow, March 4, 1874.]

The recent extraordinary increase in the price of coal, which, as regards the variety used specially for making gas, is likely to be permanent, has rendered necessary the very strictest economy on the part of gas companies and of corporations which supply gas. One result of this necessity has been, that the price of gas has been raised, in many cases, 50 per cent.; and another, that the quality of the gas supplied has been reduced as far as it has been considered safe to go in that direction. In most large towns, especially those in which the gas is supplied by the corporation, a standard illuminating power has been fixed by Act of Parliament; but, previous to the rise in the price of coals, gas of a far higher illuminating power than that demanded by the Act, was actually supplied. In the case of Edinburgh, there are two competing companies; and of these, one, until very recently, supplied 30 to 32 candle gas, the other about 26, both charging the same price. Now, I understand, the standard of 26 candles is adopted by both companies. In our own city, we had formerly two gas companies, both bound by Act of Parliament to supply gas of not less than 12-candle power; but the gas made by the old company actually had an illuminating power averaging about 28 candles, and was often above 30, while the new or City and Suburban Company gave gas averaging 26 or 27 candles. In 1863 these two companies were taken over by the corporation, who have since supplied Glasgow, and who are bound to give 25-candle gas. For two years or so the illuminating power averaged about 28 or 27½, and last year it was about 27. This year the average of all the works is something like 27 candles; but it varies a little, some of the works (of which there are now five) giving systematically a slightly higher standard of illuminating power than others. Although it is no part of my present purpose to discuss the local bearings of the question, I may state that, in general, the gas is of higher illuminating power, and more regular in quality, when made in one or other of the smaller works, than when produced in the larger establishments. At the Dalmarnock works it is necessary, during the winter months, to carbonize about 400 tons of coal daily, and it has sometimes occurred that a large portion

of the coal has been taken direct from the railway trucks, often dripping with water, to throw into the retorts. In the new gas-works at Dawsholm, near Maryhill, which, when completed, will be about as large as all the previously existing works put together, a very large space has been set apart for the storeage of coals, so that these may be always used dry and in good condition.

The tendency, as I have already stated, has been to advance the price of gas and to lower its quality, as far as Acts of Parliament will permit; and the question naturally arises, whether gas is commonly burned so as to bring out its greatest possible value. We talk of gas being 25 candles, but that does not by any means imply that any jet of that particular gas will give the light of 25 candles. This is what the Glasgow Gas Act, 1869, says (page 38): "All the gas supplied by the corporation shall be at least of such quality as to produce from a union jet burner, capable of consuming 5 cubic feet of gas per hour, under a pressure equal to a column of water ·5 of an inch in height, a light equal in intensity to the light produced by 25 sperm candles of 6 in the pound, burning 120 grains per hour."

Here we have defined—1st, the quantity of gas to be burned in an hour—namely, 5 cubic feet; 2nd, the kind of burner to be used—a union or fishtail jet; and 3rd, the pressure at which the gas is to issue from the burner—five-tenths of an inch of water pressure. I do not know by whom that clause of the Act was framed, but it is an excellent one, and fully recognizes a point which I will endeavour to illustrate to-night—namely, that, in order to bring out the real economic value of the gas, it must be burned at a comparatively low pressure. It will give you some idea of the size of the burner which I find it necessary to employ, in order to comply with the Act of Parliament—it is a No. 8—that is, a jet which, under ordinary circumstances of pressure, is expected to consume no less than 8 cubic feet per hour, but which, when exactly regulated to half-an-inch of pressure, burns as near as possible 5 cubic feet.

Before entering upon the main business of my paper, I wish to say a few words on the comparative price and quality of gas supplied in different towns, as I think there is some misapprehension on the subject which it would be useful to correct. Take three towns—Glasgow, Manchester, and Birmingham. In Glasgow the illuminating power of the gas is, say, 26 candles, which is really under the average, and the price 5s.; in Manchester it is 20 candles, and the price 3s. 8d. (outside the town 4s. 2d.); in Birmingham it is 15 candles, and the price 3s. to 3s. 6d. Now, it is easy to calculate from these figures the relative values of equal quantities of light, as given by the combustion of gas, in the three towns. Let us take the Glasgow gas as the standard, 26 candles being worth 5s.; then Manchester gas is worth 3s. 10d., and Birmingham gas 2s. 10½d. As regards price, therefore, the Glasgow gas will, considering its quality, bear favourable comparison with other towns, even those that are considered the most fortunate in this respect. But some of our citizens say, "I do not know or care about your illuminating power or candles, but I go to Manchester and Birmingham, where the gas is cheaper than it is here, and I find those towns as well lighted as our own, if not better, and the gas-flames appear to be as large and to give as much light." The first answer I have to give to such assertion is, that no true comparison can be made between two lights, unless they are seen at the same time; and that, even if the flames are side by side, the comparison is useless and misleading, unless the same amount of gas per hour is burned in each jet. The size of a gas-flame does not depend entirely on the quantity of gas consumed, but also upon the quality: two flames may be equal in size, and yet the one may be burning twice as much gas as the other. A jet of a given size, and at a given pressure, will pass much more of a light gas than it will of a heavy one; and the gravity of coal gas varies in proportion to its richness in those constituents upon which the illuminating power chiefly depends. But the size of a flame does not only vary with the gravity of the gas, but with the proportion of heavy hydrocarbon. When gas contains a little air, not only is the illuminating power immensely reduced, but the flame becomes comparatively small; and in like manner, the flame of a poor gas is small compared with that of a rich gas, the amount of each being the same. If, then, it be a fact that the gas-flames are as large in Birmingham and Manchester as here, it only proves that in these towns larger burners are used than are commonly employed here. I have heard it stated on good authority, that although Birmingham has little more than half the population of Glasgow, the total consumption of gas is as large as it is here. I may mention another striking fact, that the burners used for what is called common gas in London, Birmingham, and various other English towns, are provided with much wider openings than those used here; and that the burners are totally unsuitable for burning our gas, producing with it a smoky flame, and giving comparatively little light. I have, for the purpose of showing you practically the difference between our gas and such as is used in London, Birmingham, and most of the English towns, prepared a quantity of gas from common coal, equal to about 14 candles, and I shall burn it, and also the Glasgow gas, exactly at the rate of 5 cubic feet per hour, using identical meters and burners, so that the test may be strictly comparative. The result, I have no doubt, will convince you that our gas is very different, indeed, from that you have been accustomed to see in English towns, and I trust it may in some measure reconcile you to the paying of a price which, although much larger than we have been accustomed to, is moderate compared with other towns, when quality is taken into account. There is one English town which, I confess, fairly beats us in the economical production of gas, insomuch that they show a larger surplus. I mean Manchester; but I understand that the reason for it is the larger price that is obtained for the coke produced in the gas-works of that town. However, that is a matter which I should scarcely touch upon. If the Glasgow Corporation charge too much for their gas, there is no reason why I should undertake their defence, and that for two reasons—first, that they are well able to defend themselves; and, second, that my duty, as a public official, is simply to see that the corporation keep up the quality to the standard required by the Act of Parliament.*

With regard to the prospects of an early reduction in the price of gas, I must ask you to allow me to make a short quotation from a recent number of the JOURNAL OF GAS LIGHTING (Feb. 10, 1874, p. 177), where, in discussing this subject, the editor makes the following remarks:—"In Scotland the effects of the rise in the price of cannel are much more apparent. The names of 222 undertakings appear on our list, and it will be seen that of these, 66, or nearly one-third, raised the price of gas in the course of last year. We must remark here again that the advances were numerous in Scotland in the previous year, and thus the advances in Scotland are greater in number than in England and Wales. No considerable fall, if any, in the cost of cannel coal is to be expected, and the Scottish companies will inevitably, sooner or later, have to consider whether or not it will be possible to continue an exclusively cannel supply. In the meantime they are unquestionably promoting the rapid exhaustion of a material limited in quantity, and which, so far as we can see, cannot be replaced; which is highly valuable as an auxiliary, but the exclusive use of which is undeniably wasteful." Further on, the same writer states that in England and Wales advances in the price of gas are most numerous in coal districts. This apparent anomaly is easily explained by the simple fact that, in districts far removed from the coal-fields, coke increases in value in a much higher ratio than it does in the coal-producing districts. And, again, as regards the Scottish gas-works, the coke produced from cannel coal is very inferior in quality, as compared with that made from English caking coal, and the increase in price of the coke is trifling, and does little to compensate for the rise in the value of coal.

But it cannot be doubted that a supply of gas of comparatively high illuminating power is a most desirable thing, independent altogether of the consideration of cost. Cannel gas gives very little more carbonic acid and other products of combustion than common gas, while it yields, in ordinary practice, twice as much light. In other words, if we wish to have in an apartment a certain amount of light, we must vitiate the air to nearly double the extent if we employ common gas, such as that used in Birmingham and London, that we require to do with Glasgow or other cannel gas, with a corresponding increase of temperature. As regards sulphur, it is even worse; for in common gas the average is about 30 grains per 100 cubic feet, while with our gas it certainly does not exceed 15 grains; so that, for equal quantities of light, about four times as much sulphurous acid is produced in burning common gas as compared with cannel gas. This is a very serious evil, and accounts, to a large extent, for the comparatively limited use of gas in the better class of houses in London and other English towns. Then, again, all our gas-fittings are adapted for cannel gas, and are often deficient even for it; and a change to gas made from common coal would necessitate a complete revolution in gas-fitting arrangements. I think you will agree with me, therefore, that we should retain our cannel gas as long as we can; and my own impression is, that by a judicious use of a mixture of splint or caking coal with oil shales, together with a limited use of cannel coal, a supply of gas of 25 to 28 candles may be kept up for very many years. Many of our splint coals give a gas of 18 to 20 candles, while the shales used in the manufacture of oil give gas of 30 to 45 candles. The oil trade is at present much restricted, and shale of good quality may be obtained in any quantity at a moderate price. The coke of oil shale is almost worthless, but, on the other hand, that of splint coal is very superior to that made from ordinary cannel coal.

I have said that the quality of the Glasgow gas is guaranteed to be 25 candles, and is in practice from 26 to 28—that is, as tested by the burner and in the manner described in the Glasgow Gas Act, 1869; but when consumed in smaller burners and at higher pressure, the result is exceedingly different; and I have reason to believe that the average illuminating power does not practically exceed 16 candles. We have here a loss of light that might be obtained by burners of proper construction and favourable circumstances as regards pressure, to the extent of about 40 per cent.; and if we calculate this upon the whole quantity of gas consumed in Glasgow, we find it to represent a money value, at 5s. per 1000 feet, of about £130,000 per annum.

I admit freely and at once that it is impracticable, not to say impossible, to obtain in the every-day practice of common life results as good as those got by means of appliances the most perfect for developing the full photogenic value of the gas; but still a very great deal might be done to decrease the reckless waste of light that is constantly going on. I have no hesitation in stating that, without difficulty, from 20 to 23 candle power might be obtained in every-day life from 26 candle gas. We are in a similar position with regard to various forces employed for practical purposes. It is easy to calculate what power, represented by a given weight lifted a foot, ought to be obtained from a given quantity of water operating upon a water-wheel; but the practical result always falls far short of the theoretical quantity. Again, the force obtained by the combustion of one pound of coal in the boiler of a steam-engine is greatly less than the calculated figure. Still, mechanicians and mathematicians struggle on to obtain better results; and we have in some of the most recent forms of turbines an immense improvement on the water-wheels formerly in common use, while in the steam-engine we have in the best kinds of compound engines an approach to theoretical performance which was formerly deemed impossible of attainment. These improvements represent money saved; and it is equally the case with gas, but with this addition, that a decreased consumption of gas, with the same amount of light, would give increased healthfulness to our dwellings, where the products of the combustion of gas are an evil of no small magnitude. Here, again, we who burn cannel gas have an immense advantage over those who consume gas from common coal; for the loss of light in their case is even greater than ours, and is probably not usually less than 50 per cent. The object I have in view to-night is to place before you the theoretical considerations connected with the combustion of gas, and to give a few hints as to the means of burning it to the greatest advantage.

When a white porcelain slab is placed over a gas-flame, a deposit of fine particles of carbon occurs; these particles exist in the flame, and the contact of the cold slab causes their instant deposition. A similar effect is produced by a current of cold air impinging upon the flame, a portion of which is thus cooled down below the point of ignition of the carbon, and the flame thus exposed to the draught smokes—that is, the finely divided particles of carbon pass into the air unconsumed. In ordinary circumstances the carbon is consumed in the upper part of the flame; and if the jet is a good one, and the pressure of the gas sufficient, no smoke is produced. In the Bunsen burner the gas is mixed with air sufficient to prevent the separation of the particles of carbon, and hence we have a flame practically valueless as a source of light, but convenient for the application of the heat of combustion to chemical vessels. The carbonaceous particles are formed in the flame by the action of the heat of the lower part of the flame, and the same thing occurs if the gas is passed slowly through a tube heated to redness, and in the retorts in gas-works a deposit of carbon is formed, which often increases to three or four inches in thickness. The source of the light in ordinary flames is the solid carbon, from the particles of which the light is radiated. Professor Frankland has shown us that the light is not entirely due to this source; but for all practical purposes we may omit all other considerations. Now the whole science of gas lighting depends upon the burning of the gas in such a manner that the formation of the carbonaceous or sooty particles is fully developed, and at the same time fully consumed—in other words, to give a bright flame without smoke. It was, until within the last few years, an accepted axiom that economy in gas lighting could only be obtained by the use of large burners, and that in small jets the contact of air with the flame was such as to ensure a too perfect and rapid combustion of the sooty particles—thus giving a flame with, considering the quantity of gas consumed, comparatively little light. Thus, to quote from a carefully compiled table of results, 2 feet of gas burned in a small jet (No. 0 union) gave a light of 3·55 candles, or for 5 cubic feet per hour, 8·9 candles—the pressure required in order to consume the quantity of gas with this small burner being 2 inches. But the same quantity of the same gas in No. 1 burner, at 1·3 inch pressure, gave 7·6 candles, or for 5 cubic feet, 19 candles. No. 2 burner, at ·66-inch pressure, gave 11 candles, or for 5 cubic feet, 27·5; and No. 3 burner, at ·45 pressure, gave 12·5 candles, or for 5 cubic feet, 31·25.

2 cubic feet of gas, at—

2·0 inches pressure,	No. 0 fishtail	gave	3·55	candles,	or for 5 cubic feet	8·9
1·3	"	"	1	"	7·6	"	"	19·0
·66	"	"	2	"	11·0	"	"	27·5
·45	"	"	3	"	12·5	"	"	31·25

These instructive figures I have selected from a valuable table of results obtained by Mr. Stewart, of the Greenock Gas-Works. It shows, apparently, that the larger the burner the greater is the illuminating power of a given

* The following table gives particulars regarding the population (including suburbs) of various towns, together with the number of meters in use, the gas-rental, the value of coke, tar, &c., and the price of gas for the year ending Jan. 30, 1873:—

	Glasgow.	Manchester.	Birmingham.	Liverpool.
Population	560,000	500,000	350,000	550,000
Number of meters in use	106,483	64,293	50,000	60,000
Gas-rental	£252,619	£267,636	£236,753	£277,727
Coke, tar, ammoniacal liquor, and meter-rents	£32,000	£63,782	£182,019	£89,700
Price of gas	4s.	3/6 & 3/9	2/3 to 2/7	3/6 & 5/9
Illuminating power, candles	27	20	15	20

quantity of gas; but it shows, also, what is equally important, that the lower the pressure the better is the result. By forcing gas through a small opening, the contact of the oxygen of the air becomes so intimate that an immediate combustion of the carbonaceous particles takes place almost at the moment of formation; but if allowed to escape gently, a much better result is obtained. I could give you many illustrations of this, but shall take just two from Mr. Stewart's table. The smallest, or No. 0 burner, which gave such a remarkably low result, gave, with a consumption of 1·5 cubic foot per hour, a light of 4·34 candles, or for 5 cubic feet, 14·25; and again, the No. 3 jet, which gave such a very high result at low pressure, gave, with a consumption of 5 cubic feet per hour, which required a pressure of 1·7 inch, only 22·5 candles, or little more than 2-3rds of the power obtained at a pressure of ·45 inch and consumption of 2 cubic feet per hour. Now, recent investigations have clearly shown that very fair values may be obtained even with very small burners, provided always the pressure is reduced sufficiently low to allow the gas to pass gently into the air. This reduction of the pressure may be effected in two ways—1st, the gas may be reduced in velocity by means of a governor or regulator placed at some distance from the point of ignition; or 2nd, it may be effected by contracting the lower part of the burner, or checking the flow of gas through the burner, by stuffing it with cotton wool, cloth, or iron filings, or obstructing it in some other way. All the patent gas-burners recently introduced are constructed upon this principle—all they do is simply to pass the gas into the air at a low pressure.

Let us now examine some of the forms of gas-jets, and let us take first the original burner, the familiar rat's-tail or cockspur jet, which, in Glasgow, is commonly used in street-lamps and stair-lights. It is made of cast iron, bored as wide as possible throughout, leaving a thin shell at the top, which is then pierced with a fine orifice. I have tested two sizes of these burners at various pressures, and the experiments show that, under any circumstances, it is impossible to obtain a high result. The gas used, when tested in the usual manner, gave a light equal to 29·24 candles. The smaller burner had an opening of 1-43rd of an inch, and the larger one an opening of 1-32nd of an inch. The results were these:—

Burner.	Pressure.	Length of Flame.	Gas per Hour.	Illumin. Power.	Illum. Power per 5 Cubic Feet.
No. 1	·5 inch.	2 inch.	·45 c. ft.	1 cand.	11·1 cand.
„ 1	1·0 „	3½ „	·60 „	1·9 „	15·8 „
„ 1	1·5 „	4½ „	·90 „	2·7 „	16·6 „
„ 2	·5 „	3½ „	·80 „	2·8 „	17·5 „
„ 2	1·0 „	5½ „	1·13 „	4·0 „	17·7 „
„ 2	1·5 „	7½ „	1·45 „	5·1 „	17·6 „

It thus appears that with No. 1, which is, I understand, used for stair-lights at ½-inch pressure, not much more than one-third of the light the gas is capable of yielding, when properly burned, is obtained; and in no case more than about 57 per cent. The No. 2 jet is somewhat better, giving uniformly about 60 per cent. of the real value of the gas.

When two rat-tail jets are held at about a right angle to one another the lights coalesce and form a flat sheet of flame. When this discovery was first made two burners were fitted up in this way; but soon a single burner was contrived which combined the two, and hence was called, and is still called, a union jet, or sometimes a fishtail. It is simply a short cylindrical tube with a flat top and with two orifices, drilled at about 90° to one another, and meeting in the centre. A great improvement has been obtained by cutting off the metal top and substituting one of porcelain or earthenware, the advantages obtained being that the body of the burner does not heat, and particularly that the orifices remain constant in size, while those of iron gradually rust up, and in order to give a satisfactory light require to be occasionally cleaned. In some cases the entire burner is constructed of earthenware, or, as it is called, lava; but I do not like these jets, as, when fixed in by means of white lead, they cannot be removed without breaking them.

Several kinds of union burners with obstructions to reduce the pressure have been introduced. Leoni's jet is partly brass and partly iron, with an "adamas" or porcelain tip, and the obstruction consists of a thin web of cotton wool inserted above the iron part of the jet. This is a very good burner, but rather clumsy in appearance. Another, and, as I think, a better kind, is that called Bray's regulator. This has a brass body of the ordinary size, and the obstruction consists of a double layer of cotton cloth stretched over a brass ring. As I consider these the best union burners obtainable at moderate cost, I have selected them for a series of experiments, to which I shall briefly refer. Nine sizes of jets were tested, and each was tried at three different pressures—½ inch, 1 inch, and 1½ inch. These tests were made on three different days, during which the gas varied slightly in illuminating power. During the ½-inch trials it was 27·72 candles; during the 1-inch trials it was 29·05; and during the 1½-inch tests it was 28·61; the average being 28·46, or say, 28½ candles. The results obtained are represented in this table:—

Union Jets (Bray's Regulators).

Burner No.	At 1½-inch Pressure.			At 1-inch Pressure.			At ½-inch Pressure.		
	Gas.	Ill. Power.	Calculated to 5 C. Ft.	Gas.	Ill. Power.	5 Cubic Feet.	Gas.	Ill. Power.	5 Cubic Feet.
0	1·0	2·9	14·5	1·5	3·5	11·7	2·0	3·5	8·8
1	1·15	4·0	17·4	1·8	4·8	13·3	2·45	4·8	9·8
2	1·5	6·0	20·0	2·3	8·1	17·6	3·0	8·3	13·9
3	1·8	8·5	23·6	2·75	11·3	20·6	3·55	12·4	17·5
4	2·4	12·0	25·0	3·6	17·0	23·6	4·3	16·7	19·4
5	2·6	13·6	26·15	4·35	22·8	26·2	5·1	24·2	23·7
6	3·15	17·0	27·0	4·95	28·4	28·7	5·8	30·0	25·9
7	3·8	21·4	28·16	6·05	36·6	30·2	..	gas blows.	..
8	4·7	26·4	28·08	7·1	45·4	32·0	..	gas blows.	..

These experiments bring out very strikingly the fact that gas burned in small jets can only be made to give a fair amount of light when the pressure is low. No. 4 jet, at ½-inch pressure, burns 2·4 cubic feet per hour, and the light, calculated to 5 feet per hour, is 25 candles; at 1-inch pressure, No. 2 jet burns 2·3 cubic feet per hour, and the light, calculated to 5 feet, equals 17·6 candles; at 1½-inch pressure, No. 1 jet consumes 2·45 cubic feet per hour, and the light, calculated to 5 feet per hour, is equal to 9·8 candles. Five cubic feet of gas, therefore—

At ½-inch pressure, gives the light of 25 standard sperm candles.
„ 1 „ „ 17·6 „
„ 1½ „ „ 9·8 „

Another very good description of union jet is that known as Morley's patent. This is a brass burner of rather clumsy shape, with "adamas" tip, and at the bottom one or two small holes of about the same area as the holes in the top of the jet. Then there is Williamson's jet, of nearly the same shape externally as Morley's, but unnecessarily complicated in the mode of reducing the pressure. Da Costa's burner is a large hollow vase, stuffed with iron turnings; and there are many others, but they are all expensive, and their performance is no better than that of Bray's burner, which is retailed at 2d. each. And here I would remark that none of these burners *regulate* the flow of gas, they only *obstruct* it; but even this is a useful result, when the pressure in the main is, as it almost invariably is, too high for the economical combustion of gas—not the least important effect being the prevention of "hissing," which is often an intolerable nuisance. But when the supply of gas is defective, from the pipes being too narrow or in some way obstructed, the use of any of these stuffed burners does harm rather than good.

Another method of breaking the pressure is, by placing a thin piece of platinum across a union jet. This is the principle patented by Mr. Scholl, of London; and the effects of his burner upon the light given by the common gas of London have been very highly spoken of by Dr. Letheby, Professor Frankland, and other eminent authorities. More recently Mr. Scholl has introduced a burner, similarly constructed, for burning cannel gas; but I find that it is better adapted for English cannel gas (20 to 23 candles), than for that made in the Scotch gas-works.

After the rat-tail burner had been in use for some time, a modification of it, with three orifices instead of one, was introduced, and this was called a cockspur jet; and another was subsequently invented, in which a series of very fine holes was placed across the top of the burner, giving a practically flat flame, which was called a bat's-wing. This system was soon supplanted by a slit, which was found to answer the purpose equally well, if not better; and our present bat's-wing burner is simply a cast-iron tube, having a top with a straight slit cut in it. This jet is also made in earthenware and in steatite—a magnesium silicate which is indestructible by heat, and is easily turned and cut. The bat's-wing jet is particularly adapted for large-sized burners, consuming from 3 to 5 feet per hour, and it requires an even lower pressure than the union or fishtail jet in order to burn the gas with the greatest economy. With a pressure of 3½ to 4·10ths of an inch, a bat's-wing consuming 5 cubic feet per hour may be made to give, at least, as good a result as the best fishtail jets; and the standard burner used for testing the cannel gas (20 to 23 candles) in London and some other places in England, is a steatite bat's-wing of this kind. With gas of 26 to 30 candles, the union burner described in the Glasgow and Dublin Gas Acts gives equally good results; but with gas from 20 to 25 candles, the bat's-wing indicates a sensibly higher illuminating power.

The great loss of light experienced when gas is consumed in bat's-wing burners at any but comparatively low pressures has given rise to many efforts to combine with the jet an apparatus to reduce the pressure of the gas, which, in the gas-mains, usually ranges from 1 to 2 inches, and is sometimes even higher. Various bat's-wing burners having obstructions, as in the case of the union jets already described, have been constructed, but, perhaps, the best of them is Brönner's. This is a rather wide brass cylinder tapered at the bottom, and having at the top a short steatite burner, which screws in. At the lower or contracted end a piece of steatite is inserted, in which is an oblong slot. The gas has to force its way through this slot, which has a smaller area than that of the slit at the top, and it expands into the brass cylinder and escapes through the slit at a pressure of from 2 to 5-10ths of an inch. The rate of consumption is, therefore, dependent on three conditions—1st, the area of the opening at the bottom; 2nd, the area of the slit of the burner; and 3rd, the initial pressure of the gas. There are two kinds of Brönner's burners, intended respectively for common and cannel gas—the former having much larger openings at the top than the latter. Those for common gas are very much used in London, and are exceedingly effective; but they are of no use whatever for Glasgow or other cannel gas. There are six sizes of Brönner's burners for cannel gas, the difference being entirely in the area of the rectangular slot at the bottom, and there are five sizes of steatite tops, so that we have no fewer than 30 combinations, thus affording a most extensive range of selection to suit any description of gas or any standard of pressure. Of the 30 combinations, however, I have found six to be unsuitable for our gas when the pressure is low (1 inch), but only one at a pressure of 1½ inch. The photometric results are contained in the preceding table. The gas used, tested as usual, was of 28·2 candles.

Brönner's Burners.

At 1-inch Pressure.					At 1½-inch Pressure.				
Burner No.	Top No.	Cubic Feet per Hour.	Illuminating Power.	Calculated to 5 Cubic Feet.	Burner No.	Top No.	Cubic Feet per Hour.	Illuminating Power.	Calculated to 5 Cubic Feet.
2	2	1·2	6·0	25·0	2	2	1·4	5·7	20·4
2	3	1·4	7·2	25·7	2	3	1·65	8·0	20·5
2	4	..	Smokes.	..	2	4	2·3	11·2	24·3
2	5	..	„	..	2	5	2·4	12·2	25·5
2	6	..	„	..	2	6	..	Smokes.	..
2½	2	1·4	5·5	19·6	2½	2	1·9	9·0	23·7
2½	3	1·7	9·2	27·0	2½	3	2·3	11·0	23·9
2½	4	2·03	11·2	27·6	2½	4	2·7	13·1	24·3
2½	5	..	Smokes.	..	2½	5	2·85	15·5	27·2
2½	6	..	„	..	2½	6	3·0	16·5	27·5
3	2	1·45	6·8	23·4	3	2	2·0	9·2	23·0
3	3	1·90	9·4	24·7	3	3	2·4	12·3	25·6
3	4	2·13	12·2	28·7	3	4	2·8	16·1	28·7
3	5	..	Smokes.	..	3	5	3·15	18·7	29·7
3	6	..	„	..	3	6	3·25	19·6	30·2
3½	2	1·5	6·3	21·0	3½	2	2·12	9·6	22·9
3½	3	1·95	9·0	23·1	3½	3	2·55	13·7	27·2
3½	4	2·35	13·1	25·7	3½	4	3·0	15·7	27·6
3½	5	2·80	15·6	27·9	3½	5	3·5	19·6	28·6
3½	6	3·0	16·9	28·2	3½	6	3·6	21·1	29·9
4	2	1·6	6·9	21·6	4	2	2·3	10·6	23·0
4	3	2·1	11·6	27·6	4	3	2·9	15·0	25·9
4	4	2·65	14·5	27·4	4	4	3·3	18·5	28·0
4	5	3·45	19·1	27·6	4	5	4·1	23·4	28·5
4	6	3·55	19·6	27·6	4	6	4·2	24·3	28·9
5	2	1·77	8·0	22·6	5	2	2·6	10·5	20·2
5	3	2·3	12·9	28·0	5	3	3·3	14·8	22·4
5	4	3·3	16·7	25·3	5	4	4·0	21·6	27·0
5	5	4·1	22·5	27·4	5	5	5·0	27·5	26·8
5	6	4·3	24·6	28·6	5	6	5·3	30·0	28·3

The average of the tests at 1 inch pressure is 25·7 candles, and of those at 1½ inch pressure, 25·8 candles.

The advantage as compared with seven sizes of ordinary bat's-wing burners at the same pressure is about 20 per cent.; and, as compared with seven sizes of union jets, 15 per cent., but the difference is greatest in the smaller sizes. In eight cases at 1½ inch, and one at 1 inch, the results were superior to those obtained by the standard union jet. There are several burners of a shape similar to that of Brönner, in which the opening below is capable of adjustment by a screw.

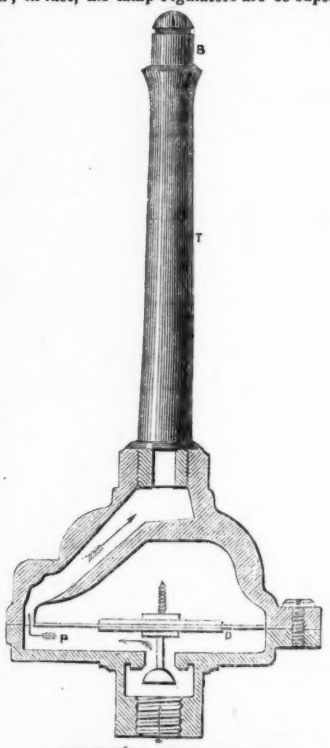
Another way of improving the light of gas of low quality, where bat's-wings are used, is to use a double-slit burner. If two bat's-wing flames are brought together, especially if the slits of the burners are narrow, and the pressure rather high, the sum of the two lights when joined is very considerably in excess of the same jets when separate, and the difference is usually so great as to be apparent to the eye without requiring the aid of a photometer. But with flames burning at reduced pressure, as in Brönner's burners, especially if the gas is of high quality, the result of joining the two jets is to diminish rather than increase the light, with the production of much smoke.

There is just another bat's-wing that I wish to mention, although it is not one that is of any use for such gas as we burn in Glasgow, but it is so valuable for common gas, and particularly for air gas, which is used to some extent in the United States and Canada, that I cannot omit to show it. It is called the regulating burner, and was patented in the United States in 1871, and it consists of a very much elongated bat's-wing, with rather narrow slit, surrounded by a brass tube, into which a portion of the gas (the amount being regulated by a small screw) escapes and burns around the bat's-wing, the force of the gas issuing from the narrow slit giving direction to that burning at the top of the brass tube, spreading out the whole to a fine soft flame.

I do not propose, on the present occasion, to take up the subject of Argand burners—first, because our time will not allow me to describe the improvements recently introduced intelligibly; secondly, because the subject has been fully discussed by Mr. Kirkham and Mr. Sugg, of London, and the results published; and thirdly, because our cannel gas cannot be burned profitably or conveniently in Argand burners, their use being entirely confined to the combustion of gas of low quality—say from 12 to 18 candles. I have here various forms of Argands, the improvements over the older forms of the Argand consisting of means of preventing too strong a draught in the chimney, and of preventing the escape of the gas at too high a pressure. Sugg's London Argand, which is now generally used in England for testing gas made from common coal, accomplishes these ends in a way that leaves little hope of any further improvement being effected; and the adoption by the English gas examiners of this burner has raised the standard of common gas at least two candles—that is, from 14 to 16 candles.

Before leaving the subject of burners, allow me to say that it is of very great consequence that these should fit closely, for a slight escape of gas at the base of the burner causes a very considerable loss of light, besides producing usually a most disagreeable and unwholesome odour. All burners should be fixed with white lead; when this cannot be had, a little yellow soap, scraped off from a cake recently used, may be employed as a temporary expedient.

Now, as I have already hinted, the effect of reducing the pressure in gas-burners is only a partial cure for the evil it is intended to remedy; for the pressure in the mains is variable at different periods of the day, and is influenced by many accidental circumstances, and may vary at any given place from an inch, or even less, to two inches, or even more. The consumption of gas by any given burner, whether stuffed or otherwise, may therefore be double at any one time what it is at another; and, whether as a matter of economy or of comfort, it is most desirable that we should have the means of protecting ourselves from the effect of changes of pressure in the mains. For a great many years gas engineers and other experts in the science of gas lighting, have recognized this as the great desideratum of gas illumination, and many regulators have been introduced and patented, in some of which mercury was employed as the regulating medium. But most of these have had some defect which has caused their use to be discontinued, and many of them are too expensive for general use. A few years ago a simple form of gas-regulator for street-lamps was introduced, I do not know by whom; and various forms of it and improvements on it have been made by Mr. Sugg and many other practical gas engineers. Of all the modifications of the instrument, the best, in my opinion, is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his lamp-regulators are so superior that they are likely to supplant all others. Already, about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town—the saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. The construction of the regulator will be readily understood by examining the instrument, and from the drawing upon the wall. The principle is a simple one—the actionof the pressure of the gas on a diaphragm of leather, or other flexible membrane, carrying a brass ball or cone placed within a socket, so that the greater the pressure of the gas, the smaller becomes the space between the cone and the socket. By means of weights, the instrument can be adjusted to work at any desired pressure, and the lamp-regulators are usually set at ·5 inch; and one of the great advantages of Mr. Peebles's apparatus over all others is, that it can be regulated while the gas is burning. Formerly, leather such as is used for the drums of dry meters was the substance used for the diaphragm; but Mr. Peebles has also used bladder-skin, soaked in glycerine, which is found to answer the purpose admirably, provided the regulator is placed outside the glass globe or lantern, so as not to become heated. Regulators of a larger size, suitable for dwelling-houses, workshops, public halls, and churches, are now constructed, and are likely to come into general use. I have had one attached to the meter in my own house for about two years and a half, and I can speak of its performance with the highest praise. It is set at ·9 pressure, as I use obstructed burners, some of Brönner's, but mostly Bray's; but with common unstuffed burners it should be set lower, say ·6 or ·8. In my own case, I have not found the pressure on the gas throughout the house to vary sensibly, whether only five or six or upwards of 20 burners are lighted; and the instrument appears to accommodate itself almost instantly to any variation in the pressure on the mains outside the house. In churches and public halls, the audiences are frequently annoyed by the jets suddenly flaring up and hissing, owing to some change in the pressure in the mains. Not only would such unpleasant occurrences be prevented, but a saving of at least a third of the gas consumed would be effected by the use of a regulator. In mills and other public works, a regulator should be placed in each flat of the building; but for houses, churches, and halls, it is sufficient to attach a single instrument to the outlet of the meter. By the kindness of Mr. Peebles, of the Fountainbridge Meter-Works, Edinburgh, I am enabled to exhibit various specimens of regulators, suited to private houses, and to churches and public works.



PEEBLES'S LAMP REGULATOR.

I must here notice an invention of Mr. Sugg of London, in which a very small-sized regulator is placed immediately below the burner for domestic use. These regulators differ from those employed for lamps in so far as the upper side of the diaphragm is not exposed to the air, and I find that they are not really regulators, as they only check the flame of the gas. A good street-lamp regulator will pass the same quantity of gas within about 10 per cent., no matter what the pressure is, but those of Mr. Sugg intended for dwelling-houses do not give such satisfactory results. I have had an opportunity of testing several of these fitted with bat's-wing burners, and find them to give very nearly the following rates of consumption:—

At	·5-inch	pressure	2	cubic feet per hour.
„	1·0	„	3	„ „
„	1·5	„	4	„ „

The performance of this apparatus, therefore, is not superior to that of the obstructed burners of which I have spoken.

In all the remarks I have made hitherto, I have spoken only of naked flames, and undoubtedly, if we wish to economize the light of gas-jets, we should use them without globes or other glass vessels, which not only absorb a large proportion of the light, but very often are of such a shape that they produce a current which seriously diminishes the light of the flame itself. I find that a piece of ordinary transparent glass held in front of a flame absorbs about 10 per cent. of the light, and the loss with a transparent globe, if its size and shape are properly proportioned, is not sensibly greater. Frosted globes absorb about 25 per cent. of the light, but the character of the illumination is improved, the light being diffused, and so rendered less trying to the eye. On the same principle large globes are better than small ones, so far as the eye is concerned; but the use of them is a luxury that must be paid for in the shape of a large extra expenditure of gas in order to obtain an equal amount of light. I have made experiments with three sizes of moons, as they are called—that is, globes frosted all over, the diameter being 6 inches, 7½ inches, and 10 inches, and I find that the loss of light is

With the	6-inch	globe	25	per cent.
„	7½	„	27½	„
„	10	„	38	„

The size of the lower opening in all the globes was 2 inches, and that of the top was from 4 to 5 inches. In Brönner's system the globes are much opener below, thus preventing the draught from impinging forcibly upon the flame, and the top is also very open, the height being only about three-fourths of the diameter. This is an excellent shape, but I have not yet had an opportunity of testing a moon of this kind photometrically. I have tried what is called a carnelian globe, however, of this shape, and find the loss to be 37 per cent., which is certainly moderate, considering that the material is not transparent but only translucent. The best of shades, probably, for rooms in which there are no disturbing currents of air, are shallow or saucer-shaped glasses frosted all over; but in many apartments they cannot be used in consequence of the flame being blown about by currents. In shallow shades a large proportion of the light is reflected from the surface of the glass up to the ceiling, and if this is pure white, as it ought invariably to be, the light is thrown down upon the table and diffused through the room. The loss of light with globes had long been recognized, and various kinds of tops have been proposed in order to modify the current. I find that these, to be of any service, must be brought very close to the globe, being in 6-inch globes barely ¼ inch, and in 10-inch globes only ½ of an inch from the rim to obtain the very best effect. The saving is very considerable. In the case of the 7½-inch frosted globe the loss of light was 27½ per cent., but when a mica cover was nicely adjusted to it the loss was only 12 per cent. With the 10-inch globe also a saving of 9 per cent. was effected by a mica cover—that is, the loss of light was reduced from 38 to 29 per cent.

It is of great consequence that the light should be placed as near as possible to the point where it is required. The whole science of photometry depends upon the fact that the intensity of light decreases as the squares of the distances. Thus a light which covers a space of 1 square foot, say at 1 yard distance, will cover 4 square feet at 2 yards, 9 square feet at 3 yards, and 16 square feet at 4 yards; and as the light, which at 1 yard is concentrated upon a single square foot, is at 4 yards diffused over 16 square feet, it follows that one square foot of the latter space is illuminated to the extent of just 1/16 of the intensity at the latter distance that it was at the former. While, therefore, it is practically inconvenient to have a gas-flame too close to the eye, it should not be too far removed. A very good reading distance is about 3 feet, and a gaselier should not be removed more than 3 or 4 feet from the table, or from 5 to 6 feet from the floor. In public buildings there is often a very great waste of gas by having the jets far removed from the place where the light is wanted, and sunlights are pre-eminent in this respect.

The painting of dining rooms and other apartments in dark wainscot and other depressing styles, is the cause of an enormous waste of gas, such rooms being excessively difficult to light up, owing to the almost total absence of reflection by the walls and ceiling. Perhaps the most difficult room to illuminate—and I have seen many of the sort—is one covered with a dark green or crimson flock paper, and having an oak-painted ceiling. The depressing influence of such a room upon the mind is even a greater evil than the waste of gas resulting from the almost futile endeavour to light it up.

In the case of public works, the walls and ceiling should be kept as white as the occasional application of whitewash will make them; and when the lights are placed, as they frequently are, against the walls, they should have glass reflectors behind them I have here two excellent forms of reflectors, which I have borrowed from Mr. M'Leod, of Alston Street, one being a shallow concave mirror of pure silver deposited by the now well-known process, the other constructed of pieces of ordinary silvered glass.

I have left myself little time to speak of street illumination, although it is a very important part of my subject. A large proportion of the light of our public lamps is thrown away, allowed to pass up into the air and be lost, while in the centre between two lamps placed, say, 50 feet apart, there is a space, the almost total darkness of which is rendered only more conspicuous by the proximity of the lamps. The most successful, I may say the only successful, attempt to economise this lost light is that of Mr. Skelton, architect, of London, whose catoptric lamp, of which I have here a drawing, is a most ingenious and effective arrangement. Above the level of the flame, both in the sides and top of the lantern, are placed slips of silvered glass, by which the light, that would otherwise be lost, is reflected upon the ground at a considerable distance from the lamps, thus diminishing the darkness in the centre space I have spoken of. I have had an opportunity of practically testing these lamps, and I find that at a certain distance from the lamps the light is exactly doubled, and I understand that at a still greater distance the light is trebled, at least. There are two or more of these lamps in St. Vincent Place, and one on the Jamaica Street bridge, at either of which places you can examine their performance for yourselves. The lamps are, of course, more expensive than the common kind, but the saving of light is so great that I calculate that the extra cost would be compensated for in a single year.

The lighting of bridges is of some interest to us in Glasgow, where we have so many fine erections spanning the river Clyde. The lamps upon these are invariably placed upon the parapet, so that at least one half of the available light is lost in the depths of the river. This is an evil which might be mitigated by placing the lamps at the side of the footpath, as in ordinary streets, or by making the lamp-posts on the parapets in the form of a bracket, so that the lantern will overhang the footpath.

And now, gentlemen, I must close my lecture with the hope that I have not wearied you with too much detail regarding a subject in which I naturally take a great interest, but which is probably much less interesting to you. And yet it is a matter of grave importance, not only as regards the immense sum of money thrown away upon gas rendered ineffective by improper means of burning it—a loss which in Glasgow alone I calculate to be equal to £130,000 per annum—but still more as regards our health and comfort, for a diminished consumption of gas would undoubtedly render our dwellings more comfortable and improve our health. I sincerely trust, therefore, that my remarks this evening will have some effect in checking the extravagant waste going on everywhere around us, and conducing to the general introduction of an improved system of burning gas.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the gas consumed in Marylebone during the month of March:—

—	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·27	17·00	15·90	24·03	9·75	23·16	0·36	No trace
Chartered Company's common gas	16·45	17·10	16·00	29·22	14·28	18·41	0·52	No trace
Chartered Company's cannel gas	20·90	22·61	20·30	23·43	12·42	22·71	0·46	No trace

Mean of daily readings of barometer . . . 30·07
" " " thermometer . . . 57·30

* Each observation consists of ten readings of the photometer, at intervals of one minute.

During the month the mean illuminating power of the Imperial Company's gas was equal to the light of 16¼ sperm candles; it ranged between 15·9 and 17 candles. Once only it reached 17 candles, and on 20 occasions it exceeded 16 candles, being two candles in excess of the light required by law. The mean amount of sulphur contained in 100 cubic feet of this gas was 23·16 grains, and of ammonia the third of a grain. The mean illuminating power of the Chartered Company's common gas was equal to the light of about 16½ sperm candles; it ranged between 16 and 17·1 candles; twice it exceeded 17 candles; the standard light of this gas being fixed at 16 candles, it will be seen that on no occasion did it fall below the standard. The mean quantity of sulphur found was 18·41 grains, and of ammonia half a grain. The mean light of the cannel gas was equal to 20·9 candles; it ranged between 20·3 and 22·61 candles, and as the standard light of this gas is fixed at 20 candles, it was, like the common gas of the same company, always up to the standard. The mean quantity of sulphur found in it was 22·71 grains, and of ammonia a little less than half a grain. The pressure of all the three gases was satisfactory, and on no occasion was sulphuretted hydrogen detected in either of them by the ordinary tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

Deputation of Consumers to the Board of Trade.

A deputation of South London tradesmen, organized by the "Southwark Gas Consumers Protection Association," who were accompanied by representatives from several of the metropolitan vestries and district boards of works, waited, on the 20th inst., upon Sir Charles Adderley, M.P., President of the Board of Trade, at his offices, Whitehall Yard, "for the purpose of requesting the aid of the Board of Trade to suppress the existing monopoly of the gas companies."

Mr. Andrew Dunn, of Southwark, in introducing the deputation, said they were there to ask the interference of Government to suppress a monopoly which was every day a growing burden to the over-taxed ratepayers of London. He complained strongly of the conduct of the Phœnix Gas Company, who had a monopoly of the supply of gas to a large portion of South London, in raising the price of gas to the consumer 9d. per 1000 feet, or from 3s. 9d. to 4s. 6d., while the South Metropolitan, another company in the same district, were only charging 3s. per 1000 feet, and yet were able to pay their shareholders the maximum divividend allowed by the Gas Act, of 10 per cent. per annum. This fact alone showed that some inquiry and interference on the part of the Board of Trade was absolutely necessary.

Mr. Pook, of Greenwich, suggested that the only way to destroy the monopoly was to place the whole of the gas companies under the management and control of the Metropolitan Board of Works.

Mr. Barnett, of Greenwich, called attention to the fact that the Phœnix Company alleged as a reason for raising the price of its gas, the high price of coal; but it must be remembered that at the same time as the directors raised the price of their gas, coals were actually falling in price. At its last half-yearly meeting the company were able not only to pay a dividend of 10 per cent. to its shareholders, but to carry over a sum equal to another 10 per cent., independent of its regular reserve-fund.

Mr. Strutton, of St. Saviour's Board of Works, drew the attention of the board to the great differences in the price of gas charged by the various companies. The prices ranged from 3s. to 6s. per 1000 feet, and for public lamps from £3 to £6 per lamp. He was there to ask the board whether it was not possible to protect the public from the monopoly by fixing a uniform price for gas.

Sir Charles Adderley said the circumstances of the different districts must be taken into account.

Mr. Barnett said, on the authority of an engineer to one of the gas companies, he was prepared to show that, with coals at 33s. per ton, the cost of manufacturing gas was only 1s. 7d. per 1000 feet, and against even that sum there was to be set off the proceeds of residual products.

Mr. Lyons, of Kensington, said his district was supplied by the Chartered Company, and, while the price of their gas was being raised, its quality was greatly deteriorated, and its illuminating power much less.

Several other members of the deputation having spoken to the same effect as the previous speakers,

Colonel Beresford, M.P., said, as a gas shareholder and a director of the Surrey Consumers Gas Company, he felt bound to defend the gas companies from some of the statements which had been made, and which were no doubt made in good faith, but upon a complete misapprehension of the real facts. He contended that the company with which he was connected—the Surrey Consumers Gas Company—were as desirous as any gentlemen present to keep down the price of gas. He also explained the reason why the South Metropolitan Company were able to sell their gas at 3s. per 1000 feet. He thought the only solution of the difficulty was the purchase of the gas companies by the Government.

Sir Charles Adderley, in replying, said the question under discussion was one of considerable importance, but no definite scheme had been brought forward by the deputation, beyond suggestions, upon which the Board of Trade could act. The question was surrounded with difficulties, and he did not see how any efficient remedy could be applied to the evils alleged to exist but by new legislation. That legislation must deal with the general questions, and not with any particular company. The points raised by the deputation should have due consideration by the board, but he was not prepared to pledge the board at the present time to any definite action. He was glad Colonel Beresford had spoken, as he had had the benefit, to a certain extent, of hearing both sides of the question.

The deputation then retired.

Bermondsey.—At the meeting of the vestry of this parish on Tuesday last, the chairman, in alluding to the deputation which waited upon the Board of Trade on the previous day, said that he attended the same, and found the whole affair was a perfect bungle. Colonel Beresford, M.P., was in attendance, and near the end of the business advocated the cause of the gas companies. He supposed that he did so because he was interested as a shareholder. Mr. Pook, of Greenwich, spoke on the occasion, and he said that the only way to deal with the question practically would be for the Government to buy up the gas companies, as they had done the telegraphs. That was all that was done, and the whole affair was a muddle.—A meeting of the consumers of Bermondsey and Rotherhithe was held the same evening, at the Southwark Park Tavern, "to take into consideration the present high price charged by the Surrey Consumers Company for gas, and also to consider what steps should be taken in the matter." Mr. Priter, the chairman of the St. Olave's Board of Guardians, presided, and the first resolution adopted was—"That, having regard to the high price charged for the gas supplied by the Surrey Consumers Gas Company, this meeting form itself into a committee, with a view to obtain a reduction in the price, to obtain gas of a better quality, and to watch the interests of the consumers generally." The mover of the resolution, speaking about the charge for the hire of meters, remarked that the gas company had no more right to charge meter-rent than a grocer had to charge a customer for the wear and tear of his scales, which, probably, would be true, if one meter, like one pair of scales, would do for all the customers. The chairman, in the course of his remarks, said the whole question was surrounded with difficulty, and it would be necessary for the meeting to go seriously to work if they were to succeed in their object. The company was formed with an Act of Parliament to protect them. They had certain duties to perform, a certain dividend to pay—10 per cent.—and a certain reserve-fund to maintain. Now, to go into the matter, and to bring any pressure to bear upon the company, and convince them they were wrong, would be an arduous task. The same question had been agitated in other parts of London with very indifferent success, and the applications of companies to increase the price, although opposed by consumers, had been successful. In that part of the metropolis they were very favourably circumstanced in one thing—viz., that they had one of the directors of the gas company for their parliamentary representative. The secretary, Mr. Hudson, read a letter from Colonel Beresford, M.P., who, after stating that he could not attend the meeting, concluded as follows:—"Were I to attend, the meeting might disapprove of my views. The legislation of the last seven years in Parliament has accomplished next to nothing. The commission of last year to consider the case of the Imperial and Chartered Companies awarded them an increased price, from 3s. 8d. to 4s. 8d. and 5s. respectively. There can be no piecemeal legislation now. As I told Sir Charles Adderley and the meeting yesterday (referring to the deputation), there is only one solution of the complaint—viz., that the Government, or some members of the House backed by the Government, do next year take steps to pass a bill to buy up the companies, and thus effect (1) the uniformity of price, (2) uniformity of light, and (3) economy of administration. My bill for purchasing up the eight water companies has been read a first time. It is too late to introduce a similar bill this session for the gas companies, but I shall give notice the first week of next session to introduce a similar bill to purchase up the gas companies." The reading of the letter was received with laughter. The chairman said he thought they concurred in the suggestion of the colonel for buying up the gas companies, and he himself thought that gas and water, being two of the necessaries of life, should be under the control of some responsible municipal authority, such as the Metropolitan Board of Works. If the present agitation was to succeed, they must prosecute it with determination. A second resolution was then adopted, asking the parochial authorities to summon a great public meeting to further consider the matter, and to determine what steps to take.

Whitechapel Board of Works.—At the meeting on the 21st inst., the clerk read a letter from the Paddington Vestry asking this board to co-operate with them in inducing the Metropolitan Board to buy up the various gas companies in the metropolis. Mr. Gladding said if this course were adopted the result, in his opinion, would be most disastrous, as it had been found that the results of amalgamation were injurious to the ratepayers. He moved that no action be taken in the matter, which, after some conversation, was agreed to.

St. Pancras.—At the meeting of the vestry on Wednesday last, a report was presented from the General Purposes Committee, stating that in pursuance of the reference from the vestry as to the increase in the price of gas by the Imperial Gas Company, they have considered several communications received on the subject, and recommended that a conference be held in the vestry hall, and that each vestry and district board in the metropolis be invited to send three delegates, with a view to consider whether any, and, if so, what action should be taken on the subject, which was agreed to.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone during the month of March:—

—	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	Mar., 1873. 0°	Mar., 1874. 0°	Mar., 1873. 0°	Mar., 1874. 0°		
Distilled Water . . .					0°	0°
West Middlesex water .	20·24	21·48	0·90	0·92	14·14	3·14
Grand Junction water. .	20·14	21·84	0·84	0·96	14·24	3·20

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month the water supplied to the parish by the West Middlesex Water Company was invariably clear, bright, and well filtered; that supplied by the Grand Junction Company was on one or two occasions very slightly turbid.

Major Bolton's report upon the water supplied to the metropolis during the month of March states that the condition of the river Thames at Hampton, Molesey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was turbid and coloured from the 1st to the 4th, when it gradually improved and became good on the 11th, and very good on the 16th, in which condition it remained for the remainder of the month. The highest flood state of the river at Hampton during the month was 2 feet 6 inches above the (6 feet) summer level, and the lowest 3 inches below. At Ditton the state of the water in the river during the month was good for 11 days, indifferent for 12 days, and bad for 8 days, but was generally affected by the turbid state of the rivers Mole and Rye, which rendered the water of the Chelsea Company extremely difficult to filter.

This company is now the only one whose intake is influenced by the highly objectionable waters of these rivers. The highest state of the flood water at this place was 3 feet 9 inches, and the lowest 3 inches above summer level. The highest temperature of the water during the month was 51°, and the lowest 40°, while the highest temperature of the air at the same place was 60°, and the lowest 30°. These observations were made daily at 9 a.m. The rainfall during the month was half an inch. The water at the Thames intakes was very thick and turbid during the rains and when the river was flooded, and the utmost vigilance has to be exercised by those Thames companies not having ample subsiding and storeage reservoirs, to prevent the choking up of their filter-beds after taking in bad water. The West Middlesex Company is the only one at present which, having large reservoir capacity, avoids taking in water during floods. The Lambeth Company are making large subsiding reservoirs at Molesey, and the construction of additional subsiding and impounding reservoirs by the Chelsea, Grand Junction, and Southwark and Vauxhall Companies is most desirable, so that when the river is in a turbid condition, the flood water may be allowed to pass. The water supplied by the Thames companies, except the West Middlesex, has not been good, especially during the early part of the month, the fine clay and marl having, in many cases, passed through the filter-beds and rendered the water slightly turbid and discoloured. The Kent Company are now giving constant supply in Deptford, and having applied to the Metropolitan Board of Works, in conformity with sec. 34 of the Metropolitan Water Act, 1871, for instructions for affixing hydrants to the mains in this portion of the company's district, the board have given an order for 30 hydrants to be erected at distances of about 200 yards apart. This company are about to extend the constant supply in their district, and have issued a notice to the Metropolitan Board of Works, that, in pursuance of the provisions of the Metropolis Water Act, 1871, they propose to give a constant supply of water to such part or parts of the company's water limits as are comprised within the following district, that is to say, so much and such part of the parish of St. Nicholas, Plumstead, as is contained within a line drawn from the point in the centre of the Plumstead Road, where the western boundary line of the said parish crosses the road, and following south the said boundary line to the centre of the Anglesea Road, thence in an easterly direction along Anglesea Road, Conduit Road, Raglan Road, Durham Road, and Park Road to its junction with Griffin Road, passing northward along Griffin Road so far as Glyndon Street, and thence eastward to the south corner of Park Brewery, in Cage Lane, thence in a direct line to the Old Manor House in Wickham Lane, thence northward down Wickham Lane and Church Manorway to the South-Eastern Railway, thence westward along the railway line to Griffin Manorway, and thence along the Plumstead Road to the western boundary line of the said parish, the houses abutting on either side of the several streets named in the aforesaid line being included; this district includes about 2700 houses, and the company are now giving constant supply to such portions of the Plumstead district as are prepared to receive it. The New River Company have the power of affording effective constant service in their district. They have also commenced a new high-service covered reservoir, to contain 1 million gallons, at Southgate, in anticipation of the requirements of the water supply to Edmonton parish. The company have in a number of cases afforded constant supply by means of stand-pipes, and have agreed with a committee of the Corporation of the City of London to furnish constant supply at once to a large number of the houses of the poor situated in courts within the City bounds, and the arrangements of the officers of the corporation in connexion therewith are in course of completion; negotiations are also pending for the erection of a number of hydrants in the City. The East London Company are extending the constant system of supply in their district, and have given formal notice to the Metropolitan Board of Works, and to the Corporation of the City of London, that they propose within the next six months to give a constant supply of water throughout the district or area bounded by and contained within imaginary lines drawn along the respective centres of the Bethnal Green Road, of Brick Lane, Spitalfields, of Osborn Street and High Street, Whitechapel, of High Street, Shoreditch, of Norton Folgate, of Bishopsgate Street Without, of Artillery Lane, of Sandys Row, and of Middlesex Street, and situate within the parishes of St. Matthew, Bethnal Green, Christ Church, Spitalfields, St. Leonard's, Shoreditch, and St. Mary, Whitechapel, and the parishes or liberties of Norton Folgate and the Old Artillery Ground, in the county of Middlesex, and the parish of St. Botolph Without Bishopsgate, in the City of London, or within some or one of those several parishes and liberties, except in respect of such houses, lands, buildings, and premises within that area which now take, or from time to time shall take, their respective supplies of water from the New River Company, or are beyond the district of the East London Water-Works Company. This extensive and densely populated area, containing upwards of 3000 houses, is divided into three sections, in the first of which the constant supply will commence on the 1st of May, in the second on the 1st of June, and in the third on the 1st of July. This company retain their previously announced intention of bringing their whole district, section by section, under constant supply.

NORTH LONDON WATER SUPPLY.—We understand that a large part of the populous parish of Islington was seriously inconvenienced by an entire stoppage of the water supply from the New River Company during the week before last. On Thursday week, a main burst at the crown of Pentonville Hill, and almost simultaneously a similar accident occurred at the chief pumping-station, in the Green Lanes, Stoke Newington. From the Thursday to the Sunday the supply was, consequently, nearly cut off. Fortunately no fires occurred during the interval, or they would have given a strong confirmation to the views of the deputation to the Local Government Board, of which we gave a report at page 550 of our last JOURNAL.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) ACT.—A deputation of Liverpool ratepayers, representing the Land and Houseowners Association of that town, had an interview with the Home Secretary on the 21st inst., with the view of urging the Government not to sanction a repeal of the Municipal Corporations (Borough Funds) Act, which gives to ratepayers the power of vetoing any action taken by their representatives in the way of spending money. They complained of the recent deputation of municipal corporations having misrepresented the feeling of the constituencies on this question, and maintained that the Act was not a serious obstacle to local self-government as had been alleged. They said that the control of the ratepayers was imperatively required, and quoted as a proof of this that local taxation levied upon real property in Liverpool had increased since 1841 by 421 per cent. It was never intended that parliamentary powers should be obtained at the instance of local representatives for local purposes, except with the assent of the ratepayers. The local taxation of the whole country was estimated at 40 millions; and they considered that Parliament must have passed the Borough Funds Act in order that the ratepayers might have a control over their representatives in expenditure. In reply to the Home Secretary as to what the deputation had to say with regard to town councillors being selected for the purpose of protecting the interests of those who sent them into the council, Mr. Shaw caused some amusement by earnestly protesting that town councillors promised all sorts of economy, retrenchment, and reform before being elected—"in which," said Mr. Cross, "they don't differ from those who put up for higher honours." At the conclusion of the interview the Home Secretary said: "I have now had both sides put before me, and I am sorry to say that on an early day I am to have a third side. But the whole matter is under the serious consideration of the Government, and I shall take no hasty step." Mr. Torr, M.P., then thanked the right honourable gentleman, and the deputation withdrew.

ELECTRO-CHEMICAL EXAMINATION OF THE ACTION OF SOFT WATER ON LEAD.

The subject of the action of soft water on lead has recently much occupied the attention of the Academy of Science at Paris, and this has been already noticed in the JOURNAL OF GAS LIGHTING. The following presents a summary of the last and most important results laid before the Academy, as extracted from the *Comptes Rendus*:—

MM. Mayençon and Bergeret state that sulphuretted hydrogen is not a sufficiently exact test to discover the presence of lead in solution. It has hitherto been considered as the test most to be relied on. They have found, however, that sulphide of lead formed, on adding the test, is slightly soluble in water saturated with sulphuretted hydrogen, and also in many natural soft waters. If water containing a salt of lead be treated with an excess of sulphuretted hydrogen, and then filtered, all the lead does not remain on the filtering-paper, for the liquid that has passed through still contains some of the metal. This is readily proved by having recourse to an electric current, for the negative pole—say a platinum wire—immersed in such a solution undergoing electrotysis will speedily have a deposit of metallic lead on its surface. The presence of the lead is proved in the following manner:—The platinum wire is exposed for some seconds to the action of gaseous chlorine; the lead, if any be on its surface, is at once converted into the chloride. This is then placed on a piece of filtering-paper, moistened with a very dilute solution of iodide of potassium. Immediately a trace is afforded of the yellow iodide of lead. This result may be verified in the following way:—The platinum wire, from which only a portion of the lead has been removed as chloride, is to be rubbed on a piece of common white paper, and this is to be exposed to sulphuretted hydrogen gas, when a brown tint will be at once seen. All the results that the experimenters obtained were thus doubly verified. By many trials they became assured, having had constantly the same results, that, first, neither the artificial nor natural (*galena*) sulphide of lead were insoluble; and, second, that sulphuretted hydrogen, while precipitating a large amount of the lead as sulphide, still leaves sufficient in solution to be easily determined.

During the course of their investigations they employed a variety of solutions for the purpose of obtaining conducting liquids for use in electrotysis, such as sal-ammoniac, caustic soda, and sulphuric acid (said to be pure), but they found that all these contained traces of lead, which invalidated their experiments. They eventually employed a solution of crystallizable acetic acid, which was free from that metal.

They tried repeated experiments on the action of the waters of the Loire, Rhône, and Saone on lead, and in each case the electrotytic method showed that a portion of lead had been dissolved. The result proved that the metal was soluble even in such water as contained both carbonate and sulphate of lime (hitherto considered as preventing the chance of the lead being dissolved). Their experiments were repeated with the same results in water artificially charged with those salts of lime. Various waters used for domestic purposes at Paris afforded the same effects.

Their general conclusions are as follow:—1, that sulphide of lead is soluble in soft water, and also in sulphuretted hydrogen; 2, that sulphuretted hydrogen is not a reliable test for minute portions of lead in solution; 3, that soft river waters, more or less holding carbonate and sulphate of lime in solution, dissolve lead; as, 4, do also those liquids artificially prepared to imitate them; 5, that the water of St. Etienne, supplied to public and private establishments, &c., contains lead in solution; but, 6, that the quantity so dissolved is too small to affect the public health, as has been proved in the hospitals, schools, and other places in Paris and its suburbs supplied with that water. They have not yet satisfied themselves, however, as to how far lead may affect or enter into, physiologically, the digestive organs of the human system—a matter which they propose to further inquire into.

NEW METHOD OF UTILIZING ALL THE PRODUCTS OF THE DISTILLATION OF COMBUSTIBLE MATTERS.

By D. C. KNAB.

[From the *Journal de l'Eclairage au Gaz.*]

According to the methods at present adopted in carbonizing or distilling coal, the average production of illuminating gas is from 250 to 300 cubic mètres (8830 to 10,600 cubic feet), together with the ammoniacal liquor and tar. When turf and wood are distilled, the resulting products are gas, water charged with acetic acid, with small portions of ammonia, wood spirit, and tar. By M. Knab's method, the products of the same materials are wholly different in character. The tar and the acetic acid entirely disappear; and, instead of obtaining from coal, for example, but from 250 to 300 cubic mètres of gas, he obtains the enormous quantity of from 1500 to 1800 cubic mètres (53,000 to 66,500 cubic feet). The gases produced are combustible, and consist of pure hydrogen, mixed with carbonic oxide and other gases in variable proportions. These gases are highly fit for heating purposes, requiring a high temperature; and their direct combustion, in consequence of their richness, gives a temperature from twice to two and a half times greater, under similar conditions, than carbonic oxide produced directly from the conversion of the carbon of coal by the air. The gas thus produced, in fact, contains from 60 to 64 per cent. of nitrogen derived from the atmosphere; while the gas produced by M. Knab's process contains no nitrogen, which, of course, by its presence would much lower the calorific value of the carbonic oxide gas. In M. Knab's view, only a small proportion of the nitrogen contained in combustible matter is got by the ordinary process of distillation as ammonia; but he claims that by his method the whole of that nitrogen is obtained as ammonia, or in combination with sulphuric or hydrochloric acids, as either sulphate of ammonia or sal-ammoniac respectively.

His method of operation is as follows:—An intimate mixture is made of the combustible matter with slaked lime, and the resulting mass is distilled. The proportion of lime employed for turf is about 200 parts of slaked lime to 100 of turf, by weight. The distillation is carried on in the ordinary manner, and, as the matter is in the form of a powder, vertical retorts, heated externally, can be employed. The operation can then be continued without intermission, which would be impossible if horizontal retorts were used. One advantage of the process is, that in the case of turf it is only necessary to dry it in the open air. The water then left is sufficient to slake the lime, without the addition of fresh liquid. Lime is preferably employed, on account of its cheapness, as an alkaline agent; but, where convenient, soda and other alkalies may be substituted. An important point claimed in the invention is the use of the liberated gases for the production of a high temperature for metallurgical purposes, attended at the same time, however, with the retention of the ammonia in greater abundance than can be effected by other known processes.

PEAT FUEL.—Reports have been obtained from British Consuls in the United States on the subject of the use of peat as an article of fuel. There are vast quantities of peat bog in the United States, but one or two of the consuls mention that it is far inferior to the peat found in Ireland. In some parts of the Northern States of the Union peat fuel is roughly prepared for immediate use on the spot, and a few small enterprises have made a fairly merchantable article; but, as a general rule, peat fuel is found more expensive than wood or coal, and is not able to compete with them. Peat requires drying and preparing, to render it cohesive and compact enough for handling; and the price of labour is high. It is possible, however, that the invention of machinery which will accomplish the work economically may make peat available for fuel.

SCHLŒSING'S METHOD OF DETERMINING NITRIC ACID IN WATER.

[From a paper on the Analysis of Water, by F. Tiemann.]

The water under examination is concentrated to a small bulk in a flask fitted with an escape-tube, and every trace of air expelled out of the apparatus. After stopping up the tube, it is allowed to cool, and by aid of the vacuum thus produced within, first a strong solution of protochloride of iron, and afterwards traces of concentrated hydrochloric acid, are drawn up into the flask. The nitric oxide produced by their action is expelled by a gradual rise of temperature, and received in a cylindrical glass vessel drawn out to a point, which has been previously filled with mercury and a little milk of lime, and inverted over mercury. As soon as all nitric oxide has been driven over, water is heated for some time to a boil in a second flask, likewise provided with a delivery-tube of caoutchouc. This tube is pushed over the point of the glass cylinder, the flame removed, the point broken, and the nitric oxide is allowed to pass over into the flask. After the last traces of this gas have been driven out of the collecting receiver by a current of pure hydrogen, which is transferred to the flask in a similar manner, the latter is allowed to absorb pure oxygen as long as red fumes are produced. The caoutchouc tube, and consequently the flask, is closed by a pinchcock, and, after the lapse of 20 minutes, the nitric acid, reproduced by means of the nitric oxide, oxygen, and water, is titrated with dilute soda-lye. This process is considered accurate according to the unanimous report of the most experienced analysts. It requires, however, great skill, and appliances which not always procurable.

Reichardt, after he had satisfied himself that the portions of the nitric oxide absorbed by soda-lye were imperceptibly small and might be safely neglected, replaced the mercury by a solution of soda. He provides the gas-developing vessel with a stopper pierced with two holes, through which pass two bent glass tubes with caoutchouc connectors and pinchcocks—one for the admission of the chloride of iron and hydrochloric acid, and the other to connect with the soda-receiver and to deliver the nitric oxide generated. The receiver consists of two tall narrow bottles, the first of which has a stopper with a triple perforation, and is completely filled with soda-lye. The nitric oxide is received in the upper part of this bottle. Through two of the holes in the stopper pass bent fine glass tubes, the first of which is connected in the course of the operation with the delivery-tube of the generating-flask; the second forms the communication between the soda-lye in the collecting-bottle with that in the second narrow bottle. These two tubes pass down nearly to the bottom of the bottle. A slightly bent glass tube in the third perforation is cut off level with the bottom of the cork, is provided with an india-rubber closure, and serves to transmit the disengaged nitric oxide into Schlösing's regenerating bottle. This process is much employed, and is very convenient; but the results are slightly below the truth; 10 to 15 c.c. of an almost saturated solution of protochloride of iron are enough for 1 to 40 milligrams of nitric acid.—*Chemical News.*

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Some of the principal iron-works and foundries at Sheffield appear to have secured an influx of orders sufficient to give them a period of somewhat increased activity, whilst other firms are not a whit better employed than they have been for some weeks past.

At Staveley, Clay Cross, the Yorkshire and Derbyshire Coal and Iron Company, Thorncliffe, and the other principal foundry establishments of the district, there is still a good business doing in colliery tubbing, heavy castings for colliery and machinery purposes, gas and water pipes, hydrants, and the usual miscellaneous fittings required by gas and water works companies. It is stated that at least two of the establishments just named are turning out large lots of pipes of considerable diameter for Sheffield, in which town both companies have latterly laid down several new mains, in addition to altering services, &c. At Wincobank the Sheffield Water-Works Company is at present engaged in laying a series of new service-pipes to supply a recently-built district, which will be fed by a medium-sized main. The work is being done under the superintendence of Mr. Ayris, the company's energetic distribution engineer.

At Rotherham, the brass-works of Messrs. Guest and Chrimes, whose productions are so well known and extensively used, are well employed on the usual class of goods, comprising bib-taps, ball-cocks, hydrants, high-pressure Siemens's water-meters, plumbers fittings, engine brasses, and the like.

The steam coal trade is very dull, and prices have a weaker tendency. Best Silkstones can be bought at the pits at 14s. to 15s. per ton, and engine slack at from 5s. 6d. to 8s. 6d. per ton. During last quarter the tonnage conveyed by rail to London fell off about 46,000 tons. Coke is in light request, mainly owing to the depressed state of the Sheffield steel trade. Some lots of steam coal are being sent to Grimsby and Goole, for shipment to the Baltic, which is now open. At the Sheffield Gas Company's meeting, last week, the chairman observed that during the late coal panic they were careful not to enter into contracts for their whole supply—a precaution fully justified by the fact that they were now able to buy in the open market at very considerably less than the prices under which they had contracted.

THE NORTHERN COAL TRADE.

(FROM OUR OWN CORRESPONDENT.)

Last week affairs in the mining districts of the county of Durham assumed an awkward appearance. The masters, as we intimated last week, determined to enforce a reduction of 20 per cent. upon the wages of all persons employed about the collieries. The men resist this reduction, and without the subject can be sent to arbitration, there is evidently going to be a strike which will involve the entire coal trade of the county of Durham. The Northumberland miners are taking a middle course; they are offering to submit to a reduction of 10 per cent. In the meantime the coal trade does not improve. There was a slight rally in households the week before last, but last week what improvement had taken place was lost, and the trade had not been duller for many years than it was. Pits were fully employed; it was not on account of orders, however, but to add to stock to keep contracts running in case of a strike. Coals are quoted at all prices; the coal offices are trying to make the best bargains they can, and, as a rule, turns for loading at the shipping places are almost ready. Coasting vessels have been rather scarce, consequently rates have been firmer. London, 6s. 1½d.; to discharge at wharves and afloat, 5s. 9d.; France and the English Channel, £8 15s.; Waterford and Limerick, £11; Dublin, £9 10s. The iron trade of the North is very bad, and commercial men take a very gloomy view of the situation; why they should do so is not very apparent, but they imagine that business will become worse as the year advances. The chemical trade never was in a duller condition than at present; goods cannot be manufactured at the present quotations, and with the current rates paid for coals and wages, except at a loss. Under these circumstances makers are curtailing their operations as far as possible, and there is a general reduction of from 10 to 12½ per cent. upon wages. The price of chemicals is very low. The timber trade has held out for a long time against the prevailing depression, but there are large stocks on hand in the northern ports, and prices have begun to yield. It is believed that all kinds of building material will get lower. Cut nails have been reduced £1 per ton. People are withdrawing out of speculative transactions as much as they can, and new colliery operations continue to be restricted as far as possible. The favourite investments in the North are gas shares, which stand firm in the market. The Northumberland coalowners and the miners of that county came to a satisfactory arrangement on Saturday. The miners agreed to submit to a reduction of 10 per cent., which was accepted by the masters, and work will go on as usual. It is hoped that this arrangement will lead to a satisfactory adjustment of the differences existing between the Durham miners and the employers in that county, before the notices terminate on Friday next.

Richmond Water Supply.—On Saturday morning Major Tulloch, the inspector appointed by the Local Government Board, resumed the inquiry respecting the application of the Richmond Select Vestry for power to borrow £28,000 for the construction of water-works for the parish, which is now supplied by the Southwark and Vauxhall Water Company. Mr. Meadows White, instructed by Mr. Senior, the vestry-clerk, appeared for the vestry, and the scheme was not opposed. It is proposed to supply the parish by means of artesian wells bored into the chalk, at an estimated cost of £28,362. Messrs. Russ and Minns, the engineers, produced their plans, estimate, &c., and Mr. Hawkesley, C.E., gave evidence in favour of the scheme. After a few questions from Mr. Burt, Mr. Young, and other gentlemen, the proceedings terminated.

The Effect of Loch Katrine Water on Galvanized Iron.—At the meeting of the Glasgow Philosophical Society, on the 1st inst., Mr. James R. Napier read a paper "On the Effect of Loch Katrine Water on Galvanized Iron." He called attention to the fact that the zinc from galvanic iron goods dissolved very rapidly in Loch Katrine water, and that some warning or notice was necessary of the dangerous character of zinc coating for ships water-tanks, for domestic cooking apparatus, and for other purposes. He had accidentally made the discovery on finding the water from a galvanized iron kettle which he had made for his new cooking apparatus become quite milky after the water lay for 10 or 12 hours in it. If this arose from galvanic action, it must arise from the impurity of the zinc, as pure zinc is said by chemical authorities not to be soluble in pure cold water. The fact remained, however, that the commercial article is a very dangerous coating for domestic cooking utensils or ships water-tanks. He exhibited water in which 2½ lbs. of galvanized iron nails and other objects had been immersed for about 30 hours. The water was of such a milky colour that no one would have ventured to call it pure. Pieces of a kitchen boiler were exhibited by Mr. John Norman as illustrating Mr. Napier's views. These were originally ⅜-inch thick, and had been coated with zinc by the so-called galvanizing process. The boiler had been about 12 months in use, when it had to be taken out for repair. It was then found that the zinc coating had entirely disappeared, and that the iron itself was greatly corroded.

Chester Water-Works.—A special meeting of the shareholders in the Chester Water-Works Company was held on the 20th inst., at which the chairman moved a series of resolutions authorizing the sale of the company's works to the corporation, the purchase-money to be calculated upon the capital of the company at the following rates:—The ordinary stock to be taken at par, £20,000; the terminable 6 per cent. preference shares also to be taken at par, £13,000; the 6 per cent. perpetual preference shares to be taken at 120, £18,000; total, £51,000. The purchasers, in addition to the purchase-money, to take upon themselves the obligations of the mortgage debt of £12,800, and all liabilities and other obligations of the company existing at the time of completion, including the cost of, and incidental to, the transfer of the property to the corporation. To this proposition an amendment was moved to the effect, that the shareholders are clearly of opinion that it is altogether opposed to their interests to sell the works to the corporation on any such terms as those proposed. On a show of hands the amendment was carried by a large majority. The polling of the inhabitants, which took place on Tuesday, resulted in 2676 votes being given in favour of the resolution empowering the Town Council to oppose the bill of the company, if necessary, and 566 against it. At the Town Council meeting, on Wednesday last, a minute of the Water Supply Committee was read, recommending that upon certain amendments being made in the company's bill, the council should withdraw from opposing it. The recommendation of the committee was agreed to.

Gas Explosion at Derby.—On Saturday evening, April 18, a serious explosion of gas occurred in Derby. It appears that a man named Turner, who lives at a house in a new range of buildings in Boden Street, off Chadwick's Lane, Osmaston Road, Derby, had engaged a young man named Harding, who lodged in the house, to lay gas on the premises. The meter had been fixed by the gas company's servants in the early part of the day, and plugs were placed in the whole of the joints, including one in the front room. Harding finished his work in the back kitchen and sitting-room, and at dusk both were lighted up. Between eight and nine o'clock in the evening a smell of gas was perceived issuing from the front room, and Harding at once opened the windows and the side passage door. In about three minutes afterwards, however, accompanied by a Miss Widdowson and another young woman, Harding entered the room with a lighted candle to discover the "escape," when a dreadful explosion occurred, partially bringing down with it the whole of the front room, sitting-room, and kitchen-room nearest the entry. Simultaneously with the crash, a volume of fire passed through the kitchen, and knocked out several panes in the windows with great force. The shutters and windows of the front room were blown across the street. Harding was knocked against the falling wall, his face, hands, and body being frightfully burned. The two young women were much shaken and injured, though fortunately not so badly as Harding. The noise of the explosion being distinctly felt throughout the whole neighbourhood, assistance was immediately at hand. After recovering from the shock, Harding found himself in one corner of the room, his hands and face being slightly charred, causing him much pain. He was conveyed upstairs to bed, and Dr. Lindley was sent for. It is supposed that the pressure of the gas, when first turned on at the main, forced out the plug in the front-room pipe. A large quantity of gas had therefore been accumulating near the ceiling, and, when the lighted candle was taken into the room, the mixture of air and gas exploded. The wall in the entry adjoining had to be propped up in several places to prevent its falling, while the front room on one side is a complete wreck.

Buenos Ayres Mutual Gas-Works.—Saturday last, at half-past seven p.m. was the time fixed for viewing the first make of gas of this company. Eight special trams, carrying about 250 persons, were put on from Plaza Victoria, leaving all passengers at the very door of the works. The leading train contained a band of music, and the long line of carriages quite took the residents by surprise. Immediately on arrival, the whole front of the fabric was quickly lighted from both ends, and the sudden sparkling of 2000 jets of gas quite astonished the people. The centre leading entrance had a large star burner, and the columns of the same were illuminated vertically, beautifully showing off the solid work. The small private entrances at each end had also two small stars, while the whole length of the fabric contained small jets placed 2 inches apart. After examining the illuminations, the company proceeded to one of the stores, which was nicely fitted up as a refreshment-room, but not one-half were able to get admission—amongst them being our own reporter. After passing champagne round, Dr. Cosme Beccar rose and gave—"Prosperity to to the Mutual Gas Company." He stated in his speech that, through the unfortunate stoppage by cholera of laying the street-mains, they were not yet in a position to supply the town with gas; but they had a proof before them of what could be done, and he hoped by the 1st of June to see the gas of this company burning in the streets of Buenos Ayres. He then gave a full description of the magnitude of the works, which we gathered as follows. They would be capable of making 1,000,000 cubic feet per day; the site contained 18,000 square varas of land; the street-pipes were nearly 100 miles in length; and the general fabric would contain all the latest improvements equal to London or Paris, and had been entirely built by Mr. George Bower, of St. Neots, England, without a single question ever occurring between them, and

whose eldest son, Mr. A. S. Bower, he had pleasure to present to the company. Mr. Roman Gimenez then spoke, followed by Senor Miguel Nazar, the president of the municipality, who expressed his opinion that no enterprise ever started in the city of Buenos Ayres would have more influence for the city's progress and advancement than this company; and, as to its future results to the shareholders, there should be but one opinion. After wine and refreshments had been handed round, the company proceeded to the retort-house and the various other portions of the works, many expressing their surprise at the enormous size of the works and its advanced state, especially the large gas-holder-tank, capable of holding 500,000 feet of gas. We had not time to review the whole of the works, which we purpose doing hereafter; but there can be no doubt everything is first class, and, with good management, there is no reason why the company should not give very great results indeed, as the company has the municipal contract, the shareholders are consumers of gas, and the fabric is situated in a district near the river, yet free from flood, and surrounded by first-class dwellings at present supplied by kerosene.—*Buenos Ayres Standard, March* 17.

Register of New Patents.

2337.—Wotherspoon, J., Glasgow, "*Improvements in closing the joints of gas-retorts, and in the means employed therefor.*" Provisional protection only obtained. Dated July 5, 1873.

This invention has for its object to render tight the joint between the covers or lids of gas-retorts and the retort proper, and consists in the employment of packing composed wholly or partly of asbestos or amianthus, laid between the cover and the end or face of the retort, against which the cover is pressed or tightened in the ordinary manner. In using asbestos or amianthus for this purpose, it is plaited, braided, twisted, or woven into a continuous length, so that it can be laid between the parts requiring to be made tight. It may, however, be disintegrated or teased, and mixed with water or other liquid, to form a pulp which may be spread over the joint or compressed in moulds or dies or rolled into sheets, and cut into any required shape. It may also be prepared by saturating it with acetic acid, or ammonia, or both, and alum may or may not be mixed with it.

2352.—Campbell, W. R., Hammersmith, and Parker, J. W., Wood Green, Middlesex, "*An improvement in gas-burners for use in street-lamps, offices, public buildings, and all places where gas is consumed.*" Provisional protection only obtained. Dated July 8, 1873.

According to this invention the burner contains a small valve which rises and falls by means of the gas acting directly on it. The valve is hollow, having four semicircular, four flat sides, and four port-holes or gas-ways at the bottom or large part; the inside opening of the burner being the largest, when the valve is down on the shelf admits through the port-holes and flat sides a larger volume of gas at a low pressure. When the pressure is high the valve rises, thereby partially covering the larger opening in the inside of the burner. The valve has, in the top or circular part, a smaller aperture which regulates the flow and consumption of gas at a high pressure.

2356.—Shepherd, J., Upper Wortley, near Leeds, "*Improvements in machinery for manufacturing gas-retorts, sanitary tubes, or other similar plastic forms.*" Provisional protection only obtained. Dated July 8, 1873.

According to this invention clay is admitted into one or more cylinders in front and steam at back. The front of cylinder is preferably conical, to facilitate the passage of the clay to a mandril, which is released from the cylinder and drawn out of plastic form, then dried and baked in the ordinary way.

2391.—Wotherspoon, J., and Foulis, W., Glasgow, "*Improved lids or covers for retorts, and improvements in making the joints thereof with the retorts.*" Patent dated July 11, 1873.

The improved lids or covers constructed in accordance with this invention are formed with lugs at the outside, by which they are attached loosely to a bar hinged at one side to the retort. At the side of the retort, opposite to the hinge, a tightening-catch is situated. This catch is carried in a socket, through which a pin formed with an eccentric on it passes. On turning round the pin the eccentric first raises the tightening-catch into contact with the free end of the hinged bar, and on being turned further round draws the catch inwards, so that the lid or cover is pressed against the retort-mouth.

That portion of the lid or cover which bears against the retort-mouth is formed with a groove in it for receiving a packing material, which, on being firmly pressed up by means of a screw in the hinged bar takes the impression of the retort-mouth, and thus fills up any interstices or uneveness thereon. In place, however, of forming the groove in the lid or cover, it may be formed in the retort-mouth, and the packing may be placed therein, or grooves for receiving the packing may be formed in both the lid, or cover, or the retort-mouth. The packing for placing in the grooves may be an alloy of tin and lead, or tin and zinc, or other metal forming a slightly compressible packing, or soft copper wire may be used. When a metal is used it may be run into the groove through an opening left in the top of the lid, and while the lid is in its position against the retort-mouth, so that the metal when cold takes the impression of the retort-mouth, or Portland or other cement may be used; it is, however, preferred to use asbestos or amianthus. In using asbestos or amianthus for this purpose it is plaited, braided, twisted, or woven into a continuous length, so that it can be laid in between the parts requiring to be made tight. In place, however, of using it in this manner, it may be disintegrated or teased, and mixed with water or other liquid, to form a pulp, which may be spread over the joint, or the pulp may be compressed in moulds or dies, or rolled into sheets, and cut or stamped into any required shape. It may also be prepared by saturating it with acetic acid, or ammonia, or both, and alum may or may not be mixed with the asbestos for the purposes of this invention.

2404.—Robinson, J., West Bromwich, "*Improvements in machinery or apparatus for charging and discharging retorts, ovens, and furnaces.*" Patent dated July 12, 1873.

This invention relates to improvements in and modifications of the arrangement of apparatus for charging and discharging gas and oil-distilling retorts; also ovens and furnaces, as described in patent No. 3335., Dec. 9, 1871.

According to this improved arrangement of the machinery it is proposed to fix a steam-boiler and pair of engines in the centre, or as near as practicable to the centre, and within or between the two quadrilateral frames hereafter referred to, in lieu of on the sides of the travelling platform, whereby more room is afforded for the engines, and the weight is more equally distributed over all the bearings of the running wheels of the platform, whilst greater facility is afforded for introducing intermediate shafts for regulating the speed of the apparatus. A substantial upright quadrilateral frame is constructed on both sides of the platform, in lieu of upon one side only, as heretofore, and the scoops and rakes travel along stationary I-bars or channel irons, which are supported directly on cross girders secured to the columns at the corners of the quadrilateral frame, in lieu of mounting the bars upon a secondary rising and falling platform or cradle.

In lieu also of supplying the coals from a special receptacle below, they are supplied direct from the coal stores or other convenient place by means of waggons, which are elevated by a vertical lift or drawn up inclined planes, and are provided with falling bottoms or with sides hinged at the top edge. Each tier of retorts is provided with its own scoop and rake, and a separate archimedian screw feeder is employed for each scoop. These screw feeders are disposed transversely over the scoops in lieu of parallel therewith.

When more than one row of horizontal retorts is used, a fixed straight vertical shoot is employed for supplying the hightest scoops and other shoots which are curved, so as to pass clear of the straight shoots for supplying the lower scoops. In order to drive these parts of the machine, there are two vertical shafts working in bearings secured to the framework, and driven from the main driving-shaft by bevel or mitre gearing, and transmitting motion to the screw feeders by an overhead horizontal shaft and bevel gearing, whilst the scoops and rakes are driven by endless chains passing round horizontal pulleys on the vertical shaft and on the framing, or on a vertical carrier shaft.

The bars which slide within the bottom of the U-shaped bars for the purpose of raising or depressing the blades of the rakes or hoes are actuated according to this improved arrangement by means of a steam piston working in a cylinder mounted on the top of the framing, connected to a rod or rods carrying tappets or rollers which may be the actuating levers of the sliding bar, in lieu of working those levers by hand, as heretofore.

2419.—Salmon, P., Burton Crescent, London, "*Improvements in steam-boilers and gas apparatuses, and in gas engines and boilers, and in apparatus connected therewith.*" Patent dated July 14, 1873.

These improvements, which relate to a previous patent by the same inventor (No. 147, 1873, see Journal of Gas Lighting, vol. 22, page 849), are applicable to steam-boilers and gas apparatuses or retorts, to produce gas from spirit, oil, tar, fatty or carbonaceous substances, which are purified by absorbing substances hereafter specified for lighting, cooking, warming, smelting of ironstone, or other ores, heating metals for rolling, conversion of iron into steel, or other purposes, such as fitting the apparatuses to fire-grates and stoves; also to gas engines and boilers, for locomotive, marine, portable, stationary, road, omnibus, tramway car, waggon, truck, or other purposes where power is requisite, in which the superheated or decomposed steam, in passing through the oils, &c., in gas generator, forms a lubricated and combustible gas, which is first used as a motive power by its elasticity or expansion, and after it has so actuated the pistons of the cylinders of any power engine, it is consumed in the boiler or boilers to raise steam from the water and expand the air (if any) forced into the boiler or superheater, and to various apparatuses in connexion with these engines.

2453.—Somerville, J., Dublin, and Robinson, J., West Bromwich, "*Improvements in apparatus for discharging gas-retorts.*" Patent dated July 16, 1873.

The object of this invention is the construction of rakes in such a manner as to make them applicable for drawing retorts of any section commonly employed, and is specially adapted for use in combination with the charging and drawing machines described in patents No. 3335, Dec. 9, 1871, and No. 2404, July 12, 1873.

The rake or rakes are hinged to one end of a tubular U-shaped or other section of iron or steel bar that may be convenient, providing it be hollow or tubular, so as to allow of a stream of cold water or air to pass through it for the purpose of keeping the rods and bars cool. Each rake-head is constructed in three or more parts, that is to say, a centre-piece with one or more flaps or wings hinged thereto on each side. The centre-piece is pivoted to the rake-bar by a strong bolt, and a second bolt is employed to pivot it to the ends of two connecting bars or plates, the other ends being attached to cross-heads, which are fitted into slots in a bar which slides within the rake-bar, and through which motion is transmitted to the rake-head. The slots in the sides of the rake bar or beam are for receiving and guiding the cross-heads, which are made of flat iron or steel, having attached to each arm a collar with an oblong hole or slot in it, and fitted on to the flat part of the arm, giving it the necessary amount of strength without weakening the rake bar or beam, which may be, and is by preference, furnished with an auxiliary or supplementary rake-head of similar construction to that just described, and attached to the sliding and rake bar in the same manner, and at any suitable distance from the ends thereof, to facilitate the removal of the coke near the mouthpiece of the retort. The rake-head flaps may each be made of one or more pieces hinged together, and to the centre-piece, and of such shape as to fit the rake for drawing the particular form of retort to which it is applied. The rake bar being of a tubular or U-shaped section may have a number of holes or slots pierced in its top or sides for the admission and circulation of air or water for the purpose of keeping it cool and maintaining its rigidity.

2454.—Jacobsen, F., Edinburgh, "*The clarification and purification of sewage, and the discharges of polluted waters by means of precipitation.*" Patent dated July 16, 1873.

The novelty of this invention consists—1. In utilizing as a precipitant the sludge or refuse obtained after the ley water of paper-mills has undergone the soda-recovering process. 2. In the re-use of the sludge obtained after such process for the precipitation of polluted waters. 3. In the use, in combination with the sludge or refuse, of common salt, sulphate of zinc, chloride of iron, perchloride of iron, either singly or jointly, in a solid or soluble state, for accelerating subsidence.

2471.—Muller, A., Amsterdam, "*Improvements in apparatus for measuring and registering the flow of water and other liquids.*" Patent dated July 17, 1873.

These improvements relate to an invention for which letters patent were granted to the present inventor, dated September 8, 1869, No. 2646, and consist—1. In the use and application of a rectangular bore for the water-passage, instead of a circular one, and having a piston of suitable material and arrangement to slide therein, so that the passages for water and air are "cut off" simultaneously and in proportion to each other, according to the extent to which the outlet cock or cocks are open or closed at the time. 2. In mechanism for working the piston automatically.

2482.—Knab, D. C., St. Denis, France, "*Improvements in the mode of utilizing the products of distillation of combustible, vegetable, and animal matters in the production of gas.*" Patent dated July 19, 1873.

The object of this invention is to convert into gas all the organic matters of the vegetable and animal kingdoms, with the exception of the fixed part forming the ashes; this is effected by distillation, either in an open or closed vessel, and mixed with a certain quantity of alkalies or alkaline carbonates.

The method adopted by the patentee is fully described in an article which appears in the present number of the Journal, translated from *Le Journal de l'Eclairage au Gaz.*

2491.—Liotard, C. L., Paris, "*Improvements in gas-burners with lateral and covered jets.*" Provision protection only obtained. Dated July 19, 1873.

This burner, which is formed of one or more concentric rings, with one or several feeders placed horizontally or vertically, is composed of two principal parts, a lower fixed part and an upper moveable part, the horizontal covered jets being made either on the one or the other, or it may be a mushroom burner.

The invention comprises the production of the jet in the casting of the burner; a system of overlapping covers or lids, whether for ring or mushroom burners, whereby any obstruction of the holes is prevented; a mode of fastening the covers to the lower part of the burners by bayonet joint; a cast-iron handle, with draught orifice beneath, the object of which is to simplify the workmanship, lessen the quantity of material, and at the same time regulate the arrival of the air, so as to obtain perfect combustion of the gas; and replacing

screw fastenings by a key of special construction, to facilitate fixing, cleaning, and repair.

This burner is applicable to all kinds of apparatuses for heating by gas—kitchen ranges, for example—and manufacturing or chemical apparatus.

2503.—WHEELER, C. G., Chicago, U.S.A., "*An improved apparatus for distributing water and regulating and controlling the passage of fluids through pipes or tubes.*" Patent dated July 21, 1873.

This invention relates to a novel apparatus designed to be attached to hose and other pipes or tubes for distributing or delivering water, and also to serve instead of an ordinary cock or valve, for controlling or regulating the passage of fluids through pipes or tubes, and for other like purposes, and consists chiefly in the employment of flat plates or discs with holes in them for the passage of the fluid, and fitted together so that one turns upon the other to open and close the holes.

2532.—WHITE, W., Hampstead, Middlesex, "*Improvements in the treatment of sewage and cesspool water.*" Patent dated July 24, 1873.

According to this invention the sewage, &c., is treated with chloride of calcium, and sometimes with sulphate of iron and lime.

APPLICATIONS FOR LETTERS PATENT.

1243.—LAKE, W. R., Southampton Buildings, London, "Improvements in water-meters." A communication. April 10, 1874.

1256.—SUFFIELD, T., Bermondsey, Surrey, "Improvements in pumps." April 11, 1874.

1260.—MOULE, Rev. H., Fordington Vicarage, Dorset, "Improvements in the production and manufacture of gas." April 11, 1874.

1269.—AUERBACH, G., and GESSERT, T., Elberfield, Germany, "Improvements in manufacturing alizarin and isopur purin out of antracene." April 13, 1874.

1279.—PORRI, J., and LEIGH, E., Blackrod, near Chorley, "Improvements in apparatus used in the manufacture of gas." April 14, 1874.

1286.—LAKE, W. R., Southampton Buildings, London, "Improvements in double-acting lift and force-pumps." A communication. April 14, 1874.

1287.—HULETT, D., High Holborn, London, and CHANDLER, S., London Road, Southwark, "Improvements in apparatus used in the manufacture of gas." April 14, 1874.

1288.—MUIR, J. S., Leeds, "Improvements in the manufacture of gas." April 14, 1874.

1289.—MUIR, J. S., Leeds, "Improvements in the manufacture of petroleum oils and spirits and like hydrocarbons for the manufacture of gas therefrom." April 14, 1874.

1308.—GOTTHEIL, R., Berlin, "Improvements in apparatuses for measuring the supply of water passing through pipes." A communication. April 16, 1874.

1321.—RADFORD, J., Bradford, Yorks, "Improvements in cocks or taps." April 16, 1874.

1332.—JOHNSTON, W., Lima, Peru, "Improvements in machinery or apparatus for compressing air or gases, or for forcing water." April 17, 1874.

1336.—THOMPSON, N., Brooklyn, U.S.A., "Improvements in means for connecting together pipes or tubes, and for connecting cocks, tubes, or pipes to other articles." April 17, 1874.

1338.—WANCHOPE, A., Niddrie, N.B., and COWAN, J., Sandymount, Dublin, "Improvements in making gas, to be called Wanchope and Cowan's new patent compensating system for making gas." April 17, 1874.

1360.—JOHNSON, R., Bradford, Yorks, "Improvements in machinery for exhausting and propelling air, gas, and other fluids and liquids." April 20, 1874.

GRANTS OF PROVISIONAL PROTECTION.

817.—ARONSON, J. N., Portland Place, London, "Improvements in lamps." March 5, 1874.

1011.—HENDRIX, P. J., Zolder, near Hasselt, Belgium, "Improved means or appliances for protecting or preserving from explosion holders containing petroleum or other explosive liquid or gas." March 23, 1874.

1027.—POUT, P. G., Balham, Surrey, "Improvements in apparatus for regulating and measuring the flow and discharge of water or other liquids for preventing waste thereof." March 24, 1874.

1041.—LEDINGHAM, A. W., Aberdeen, "Improvements in cleaning gas-retorts, and in apparatus therefor." March 25, 1874.

1043.—COLEBROOK, C. T., Islington, Middlesex, "Improvements in pump-valves." March 25, 1874.

1052.—JENSEN, P., Chancery Lane, London, "Improvements in the manufacture of gas and apparatus therefor." A communication. March 25, 1874.

1055.—NIELD, T. A., Dukinfield, "Improvements in taps or valves." March 26, 1874.

1061.—BROWN, M. H., New Cross, Kent, and WHITE, M. G., Landport, Hants, "An improved disinfecting and deodorizing apparatus for water-closets and other purposes." March 26, 1874.

1066.—KEITH, J., Arbroath, N.B., "Improvements in the manufacture of illuminating gas and in the apparatus employed therefor." March 27, 1874.

1072.—JENSEN, P., Chancery Lane, London, "Improvements in modes of and means for producing and utilizing gas and heat, and apparatus therefor." A communication. March 27, 1874.

1079.—NUTTALL, F. D., St. Helen's, Lancs, "Improvements applicable to gas-furnaces." March 28, 1874.

1116.—HAIGH, A., and BARRETT, J. H., Halifax, "Improvements in taps and cocks." March 31, 1874.

1171.—SHORT, T., Glasgow, "Improvements in apparatus for purifying sewage." April 4, 1874.

1176.—PEARSON, E., Old Kent Road, Surrey, "Improvements in taps, cocks, or valves for adjusting or regulating the flow of liquids and gaseous fluids." April 4, 1874.

1200.—FORBES, Rev. G. H., Broughton, Northampton, "A new or improved method of utilizing the foul lime of gas-works." April 6, 1874.

1207.—PETERS, S., and DONALD, W., Glasgow, "Improvements in and connected with water-closets, and in part applicable for the supply or discharge of liquids." April 7, 1874.

1211.—THOMAS, C. W. W., Buckhurst Hill, Essex, "Improvements in apparatus for manufacturing heating and illuminating gas." April 7, 1874.

1215.—RONALD, B., and FARMER, J., Glasgow, "Improvements in the modes of and apparatus for regulating the supply of water to water-closets and other vessels." April 8, 1874.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATIONS.

1223.—HASELTINE, G., Southampton Buildings, London, "Improvements in water-meters." A communication. April 8, 1874.

1287.—HULETT, D., High Holborn, and CHANDLER, S., London Road, Southwark, "Improvements in apparatus used in the manufacture of gas." April 14, 1874.

NOTICES TO PROCEED.

3980.—TASKER, W., Halifax, "Improved machinery for forming and welding and finishing couplings used for connecting steam, gas, and water pipes." A communication. Dec. 4, 1873.

4001.—MESSENGER, T. G., Loughborough, "Improvements in pipe-joints and in the couplings thereof." Dec. 5, 1873.

4038.—COCKEY, H., and COCKEY, F. C., Frome, Somerset, "Improvements in gas-stoves." Dec. 8, 1873.

4060.—DUPONT, L., Covent Garden, London, "Improvements in gas-burners." Dec. 9, 1873.

4088.—TURNER, F. W., Hanover, "Improvements in motors to be worked by gas and air." Dec. 11, 1873.

4285.—BECKITT, W. H., Chelmsford, Essex, "Improvements in the construction of valves." Dec. 31, 1873.

195.—TEALE, W. E., Manchester, "Improvements in lamps." Jan. 15, 1874.

254.—SYNGE, M. H., Pall Mall, London, "Improved apparatus for deodorizing and discharging fluids, and for trapping sinks, drain-pipes, and tanks." Jan. 20, 1874.

255.—SYNGE, M. H., Pall Mall, London, "Improved apparatus for filtering and purifying the drainage of houses and streets." Jan. 20, 1874.

534.—WILSON, M., Brixton, Surrey, "Improvements in stench-traps." Feb. 11, 1874.

567.—RICHARDS, W., Brixton, Surrey, "Improvements in regulating the supply of fluids and liquids for the manufacture of illuminating gas, and for the apparatus employed therein." Feb. 14, 1874.

817.—ARONSON, J. N., Portland Place, London, "Improvements in lamps." March 5, 1874.

907.—HUNTER, A. G., Flint, North Wales, "New and improved apparatus for carburetting atmospheric air, and improvements in other apparatus connected therewith." March 13, 1874.

946.—WARNER, W. J., Gas-Works, South Shields, "Improvements in gas-meters." March 17, 1874.

1011.—HENDRIX, P. J., Zolder, near Hasselt, Belgium, "Improved means or appliances for protecting or preserving from explosion holders containing petroleum or other explosive liquid or gas." March 23, 1874.

1041.—LEDINGHAM, A. W., Aberdeen, "Improvements in cleaning gas-retorts, and in apparatus therefor." March 25, 1874.

1043.—COLEBROOK, C. T., Islington, Middlesex, "Improvements in pump-valves." March 25, 1874.

1200.—FORBES, Rev. G. H., Broughton, Northampton, "A new or improved method of utilizing the foul lime of gas-works." April 6, 1874.

1223.—HASELTINE, G., Southampton Buildings, London, "Improvements in water-meters." A communication. April 8, 1874.

1287.—HULETT, D., High Holborn, London, and CHANDLER, S., London Road, Southwark, "Improvements in apparatus used in the manufacture of gas." April 14, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3372.—BELT, A., New Cross, Kent, "Improvements in safety gas-burners." Oct. 18, 1873.

3383.—QUICK, J., jun., and RESTLER, J. W., Great George Street, Westminster, "Improvements in apparatus for measuring the passage of water and other liquids, also for pumping purposes." Oct. 18, 1873.

3457.—WEEMS, W., Johnstone, N.B., "Improvements in apparatus or means for lighting and ventilating." Oct. 24, 1873.

3528.—BOWER, G., and BOWER, A. S., St. Neots, Hunts, "Improvements in rotatory steam-engines and governors, which improvements are partly applicable to pumps and gas-exhausters." Oct. 30, 1873.

3712.—TONGUE, J. G., Southampton Buildings, London, "Improvements in water or other fluid meters." A communication. Nov. 14, 1873.

3939.—MOORE, B. T., Isleworth, Middlesex, "Improvements in current-meters, water-meters, and ships logs." Dec. 1, 1873.

167.—HEARSON, C. E., Bedford Row, London, "Improvements in Argand burners for burning coal gas or other illuminating gas, and animal, vegetable, and mineral oils." Jan. 13, 1874.

277.—TYLOR, A., and TYLOR, J. J., Newgate Street, London, "Improvements in apparatus and arrangements for containing, measuring, controlling, regulating, and arresting the supply of liquids and fluids, and preventing waste." Jan. 22, 1874.

500.—EVERETT, G. A., New York, U.S.A., "Improvements in liquid-meters." Feb. 7, 1874.

566.—BOX, W. W., Gas-Works, Crayford, Kent, "Improvements in apparatus used in the manufacture of gas." Feb. 14, 1874.

605.—ABEL, C. D., Southampton Buildings, London, "Improvements in gas-motor engines." A communication. Feb. 18, 1874.

679.—LAKE, W. R., Southampton Buildings, London, "Improvements in air-tight joints for gas-retorts." A communication. Feb. 23, 1874.

717.—ROBINSON, A. H., Merrion, Dublin, "Improvements in meters for measuring water and other liquids, and in motive-power engines, parts of such improvements being also applicable to flushing water-closets and preventing waste of water." Feb. 25, 1874.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

490.—LOWTHIAN, J., "Improvements in water-flushing apparatus." Feb. 24, 1871.

517.—ARMOUR, A., "An improved ammoniacal gas-engine." Feb. 25, 1871.

576.—DUNKLEY, J., "Improvements in sewers and the treatment and distribution of sewage manure." March 3, 1871.

619.—CANNON, W. G., "An improvement in gas, steam, or water cocks." March 8, 1871.

637.—BOTHAMS, J. C., "Improvements in the construction of pipes for the conveyance of sewage or other fluids." March 10, 1871.

646.—MURPHY, T., "Improvements in pumps." March 10, 1871.

648.—KITTOE, G. D., and BROTHERHOOD, P., "Improvements applicable to valves for regulating the flow of fluids." March 11, 1871.

677.—ROBINS, W. B., "Improvements in portable pumps." March 14, 1871.

702.—MATHER, C., "An improved mode of and apparatus for combining inflammable gas with air." March 16, 1871.

704.—BARNES, P., "Improvements in couplings for pipes." March 16, 1871.

717.—WILSON, W. P., "Improvements in apparatus used in the manufacture of gas, which improvements are also applicable to other purposes." March 17, 1871.

845.—CROLL, A. A., "Improvements in the treatment of ammoniacal liquor to obtain salts of ammonia." March 29, 1871.

846.—HALL, T., "Improvements in water-closet cisterns." March 29, 1871.

857.—NEWTON, W. E., "Improvements in the manufacture of gas for illuminating and other purposes, and in the apparatus used therein." March 30, 1871.

869.—NEWTON, A. V., "Improvements in fluid-meters." March 31, 1871.

893.—ROWLEY, J., and HUMPHREY, J., "Improved apparatus for measuring fluids or liquids." April 4, 1871.

903.—LLEWELLIN, J., "An improvement in filters for attachment to service and supply water-pipes." April 5, 1871.

PATENTS WHICH HAVE BECOME VOID

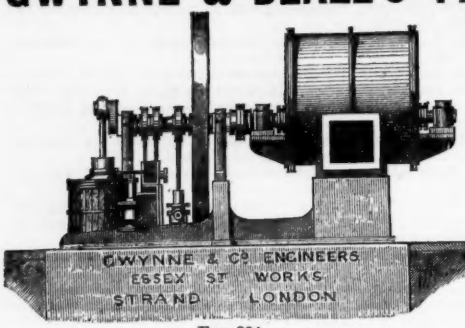
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

755.—LAKE, W. R., Improvements in rotary engines and pumps." March 15, 1867.

1071.—FLEURY, F. G., "Improvements in machinery or apparatus for measuring fluids." April 11, 1867.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,



The BEST EXHAUSTERS IN THE WORLD.
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Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

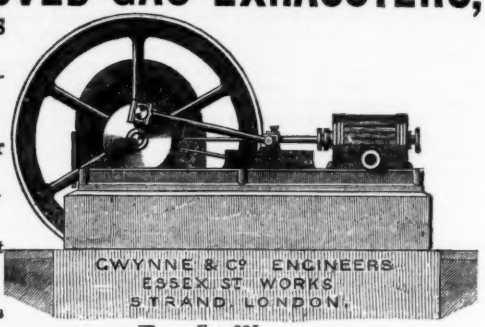


FIG. 224. FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES, CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

WANTED, a young man as Gas-Fitter. Apply, giving references, and stating wages required, to the BRECON GAS COMPANY, BRECON.

WANTED, a steady young man as FITTER. State qualifications and salary required. Apply to W. A. PADFIELD, Gas-Works, EXETER.

WANTED, by an active and persevering young man, of good experience and unexceptionable references, an appointment as CLERK, or in any position of trust.
Address W. N. P., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a thoroughly practical Gas-HOLDER MAKER, to take the entire charge of the manufacture and erection of gasholders.
Apply, by letter, stating past experience and terms, to EDWARD FINCH AND Co., Bridge Works, CHEPSTOW.

WANTED, by a practical man, a situation as MANAGER of a Gas-Work, where the make is from 10 to 30 millions. Uses the photometer. Unexceptionable testimonials as to character and abilities.
Address G. L., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Water Company, in a town of 3500 inhabitants, a competent person to act as Secretary, Collector, and Working Manager.
Applications, by letter only, prepaid, not later than the 10th of May, with copies of testimonials and salary required, to be forwarded to Mr. CLARK, Stamp Office, CHEPSTOW.

WANTED, a situation as Manager or FOREMAN of a Gas-Work. Has had 25 years experience. Disengaged on account of the Corporation purchasing and supplying gas from their former works. First-class references can be given. No objection to go abroad.
Address W. COWELL, Gas-Works, Mold Green, HUDDERSFIELD.

WANTED to purchase, 5000 to 10,000 tons of GAS COKE. Waggons can be sent to any station for any proportion of above.
Address G. J. EVERSON, Gas Coal and Coke Merchant, STOURBRIDGE.

WANTED to Purchase, a cast-iron TANK and GASHOLDER to contain from 15,000 to 25,000 cubic feet. Must be in good condition.
State price and full particulars to Mr. J. WATERMAN, Gas-Works, Eye, SUFFOLK.

TO GAS COMPANIES.

WANTED, to Lease a Gas-Work, where the make is not less than 3,000,000 feet per annum.
Address ROBERT DEMPSTER, Engineer, Elland, near Halifax, YORKSHIRE.

ADVANTAGES OF GAS FOR COOKING AND HEATING,
BY
MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.
Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

ROBUS, SIMPSON, & ROBUS,
(Late of the Crystal Palace District Gas-Works, Sydenham, and the New City Gas-Works, Montreal, Canada,)
GENERAL CONTRACTORS & RETORT-SETTERS, FITTERS & MAIN-LAYERS.
RETORTS SET ON THE LATEST IMPROVED PLAN.
Retort-Setters sent to all parts of Europe and America.
Address, J. and H. ROBUS,
BELL GREEN, CATFORD, KENT.

Now ready, Second Edition, price 7s., by post 7s. 3d.,
THE
GAS MANAGER'S HANDBOOK.
By THOMAS NEWBIGGING, A.I.C.E.

The scope of this work is apparent from its title. The First Edition, published a year or two ago was eagerly sought for, and has been now for some time out of print. The favourable reception accorded to it sufficiently proved that it supplied a generally acknowledged want in the profession. The New Edition is published in fcap. 8vo., morocco, gilt. The work has undergone careful revision; much new matter has been added; and its form altered to suit alike the pocket and the desk. Every effort has been made by the Editor to increase its usefulness and render it worthy of the position it aspires to fill—that of an indispensable companion for all persons engaged in gas making.

Orders to be sent to the Publisher,
WILLIAM B. KING,
11, BOLT COURT, FLEET STREET, LONDON, E.C.

VINCENT'S
PATENT IMPROVEMENTS
IN
Apparatus for Manufacturing Gas.
Particulars to be obtained by application to—
MR. LAYARD JONES,
ENGINEER,
25, OLD BROAD STREET, LONDON, E.C.

FOR SALE—Gas-Works in Hampshire, with possession on the 30th day of June, 1874.
For particulars, apply to Mr. ALFRED LASS, 60, Cornhill, LONDON, E.C.

FOR SALE, and ready for immediate delivery by the Barnstaple Gas Company, about 35 ft. of 12-in. Hydraulic Main, in five lengths; 15 ft. of 16-in. Hydraulic Main; cast-iron Stools for ditto; 21 15-in. Mouthpieces; a number of Ascension-Pipes, Bridges, and Dips; together with a quantity of odd castings suitable for a small work.
Feb. 26, 1874.

SLIDE-VALVES.

FOR SALE—14 12-in. and 5 10-in. Slide-VALVES with outside racks. They have been thoroughly re-fitted, and are equal to new. A low price will be accepted to effect a clearance.
Apply to JAMES WATSON, Engineer and Manager, Crystal Palace District Gas Company, LOWER SYDENHAM, S.E.

CORPORATION GAS-WORKS, BARROW-IN-FURNESS.

FOR SALE—A set of Four Dry Lime PURIFIERS, 8 ft. square, four layers (wood sieves) in each, galvanized iron covers, hydraulic centre-valve, with 9-in. connexions, and lifting crane complete.
Also TWO CAST-IRON SCRUBBERS, 18 ft. high by 4 ft. diameter, top platform, with wrought-iron railings, wrought-iron ladder, 9-in. connexions, including four Donkin's valves complete.
The above are in good working order, and are only disposed of in consequence of enlargement of works.
An inspection of the above plant, and offers to purchase, will be duly considered. JOHN LEWIS, Manager.
Feb. 5, 1874.

TO COALOWNERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for a supply of COALS, in accordance with a specification to be obtained at this Office.
The principal works of the Company are accessible by railway, in direct communication with all the inland coalfields, as well as by screw colliers from the Northern coalfields.
Tenders to be sent in to me on or before Tuesday, the 26th day of May next. By order,
JOHN ORWELL PHILLIPS, Secretary.
Chief Office, Horseferry Road, Westminster, S.W.,
April 25, 1874.

THE Directors of a provincial Gas and Water Company, within 40 miles of London, are prepared to entertain PROPOSALS for LETTING the works of the Company.
The Directors do not bind themselves to accept the highest or any tender.
For further particulars apply to G. AND W., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO CONTRACTORS.

THE Directors of the Ashton Gas Company are prepared to receive TENDERS for the excavating and building of a brick GASHOLDER-TANK, 142 ft. 6 in. diameter and 30 ft. deep.
The plans and specifications can be seen on and after Monday, April 27. Tenders to be delivered at the Company's Offices, on or before Wednesday, the 6th day of May next.
The Directors do not bind themselves to accept the lowest or any tender. By order of the Board,
JAMES EARNSHAW, Manager.
Gas Offices, Oldham Road, April 22, 1874.

HOWDEN GAS COMPANY, LIMITED.

THE Directors of the above Company are desirous of appointing a competent person as WORKING MANAGER of the Gas-Works at Howden, who will have to reside on the premises, and do such work as the Directors may order.
The person appointed will be required to enter upon his duties on the 11th of May next, and to give security, with one or two sureties, in such sum as the Directors may require.
Candidates are requested to send to me, on or before the 4th day of May next, applications in writing, stating their qualifications and the salary required.
By order of the Directors,
GEORGE ENGLAND, Secretary.
Howden, April 18, 1874.

TO COKE MERCHANTS AND OTHERS.

THE Directors of the Northampton Gas-light Company are prepared to receive TENDERS for the surplus COKE produced at their works for Twelve months, from the 1st of July, 1874, at per ton, weighed on the Company's machine.
The terms of the contract may be seen at the Office of the Company, in Mill Lane, Northampton.
Tenders to be delivered at the Company's Office, on or before the 26th day of May next, addressed to the Manager.
The Directors do not pledge themselves to accept the highest or any tender, and will require satisfactory sureties.
WILLIAM DENNIS, Secretary.
Northampton, April 23, 1874.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.
The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.
W. J. WARNER, Engineer.
South Shields.

GLASGOW CORPORATION WATER-WORKS.

RIVER SUPPLY WORKS.
TO ENGINEERS.

THE Water Committee are prepared to receive TENDERS for the construction and erection of Two HORIZONTAL PUMPING-ENGINES, with double-acting Pumps, Four Boilers, and all necessary suction and discharge pipes, valves, and apparatus. The whole to be of sufficient size and power to raise 7,500,000 gallons of water a height of 65 feet in 21 hours.

The Engines are to be erected on the north bank of the Clyde, about 4½ miles by the river above Glasgow Bridge.

Drawings of the Engines may be seen, and copies of the specification may be obtained, by applying at this Office to the Engineer, Mr. Gale.

Sealed tenders, marked "Tender for Pumping-Engines," and addressed to the Subscriber, will be received at this Office up to Saturday, the 9th of May next.

The Committee do not undertake to accept the lowest or any tender. By order,

J. D. MARWICK, Clerk to the Commissioners.

Water-Works Office, 23, Miller Street,
Glasgow, April 4, 1874.

MANCHESTER (CORPORATION) GAS-WORKS.

TO TAR DISTILLERS, CHEMICAL MANUFACTURERS, AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the purchase of either the whole or portions of the GAS TAR and AMMONIACAL LIQUOR that may be produced at their Gas-Works, situate at Gaythorn and Gould Street, Rochdale Road, respectively, for the term of One or more years, as may be agreed upon, to commence from the expiration of the periods of the existing contracts. The period of the existing contract for Gas Tar will terminate on the 28th day of February, 1875, and for the Ammoniacal Liquor on the 31st day of December, 1875. Sealed tenders, addressed to the Chairman of the Gas Committee, Albert Chambers, Albert Square, and endorsed "Tender for Gas Tar," or "Tender for Ammoniacal Liquor," as the case may be, must be delivered at this Office on or before Thursday, the 14th day of May next.

The Committee do not bind themselves to accept the highest or any tender.

Forms of tender and further particulars as to quantities and conditions of contract may be obtained on application to Mr. Thomas Peacock, at this Office, on and after Tuesday, the 21st of April instant. By order,

JOSEPH HERON, Town-Clerk.

Gas Office, Albert Chambers, Albert Square,
April 17, 1874.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

GAS PLANT FOR SALE.

THE North Staffordshire Railway Company offer the following GAS PLANT FOR SALE, viz.:—

15 15-in. Circular Mouthpieces, Lids and Crossbars.
15 6-in. by 3-in. Taper Ascension-Pipes and Bridge-Pipes.
3 Lengths of Hydraulic Main, 14-in. D shape, 7 ft. 6 in. long each.
6 Furnace Doors.
Set of 6-in. Pipe Condensers, with bottom box, eight pipes 21 ft. high.
Square washer.
2 Purifiers, 8 ft. 6 in. by 6 ft. 6 in. by 4 ft. deep, with wrought-iron lids.
2 Wrought-Iron Purifiers, 4 ft. 6 in. by 4 ft. 6 in. by 4 ft. deep, with wrought-iron lids.
12 6-in. Screw Valves.
Gasholder, 30 ft. by 16 ft., with 9 columns and cast-iron girders.
Gasholder, 30 ft. by 16 ft., with 3 columns and wrought-iron tie-rods.
Station-Meter, with 6-in. bye-pass, capable of passing about 3000 feet per hour.

The whole can be seen, and further information obtained, on application to M. JOHN MCMILLAN, Engineer, Gas Office, Stoke-upon-Trent.

Tenders for the above Plant to be forwarded to the SECRETARY, North Staffordshire Railway Company, STOKE-UPON-TRENT.

Stoke-upon-Trent, April 11, 1874.

TO GAS COMPANIES, ENGINEERS, MANAGERS, &c.

DESIGNS & PLANS of GAS-WORKS,
EXTENSIONS AND ALTERATIONS,
DRAWINGS AND TRACINGS OF GASHOLDERS,
TANKS, RETORTS, RETORT-HOUSE FITTINGS,
ROOFS, GIRDERS, CONDENSERS,
SCRUBBERS, ENGINES, BOILERS, EXHAUSTERS,
PURIFIERS, GOVERNORS, VALVES, &c.,
Prepared with despatch, and at a moderate rate.

HILL AND CO.,
23, Southampton Buildings, Chancery Lane, W.C.

DEMPSTER'S
RENOWNED
WOOD SIEVES,
WITH TAPER BARS,
MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.

PONTYPRIDD GAS-WORKS.
TO PIPE FOUNDERS.

THE Directors of the Pontypridd Gas Company, Pontypridd, Glamorganshire, solicit TENDERS for the supply and delivery of about 11,000 yards of Cast-Iron common Socket and Spigot MAIN-PIPES, with all irregular castings necessary in laying the same.

Copies of the specification, with conditions of contract and form of tender, may be obtained on application to Mr. John Lees Cocker, Gas-Works, Merthyr Tydfil (the Company's Engineer).

Sealed tenders, endorsed "Tender for Main-Pipes," to be forwarded to Montague Grover, Esq., Solicitor, Cardiff, on or before Saturday, the 2nd day of May next.

The Directors do not undertake to accept the lowest or any tender.—By order,

MONTAGUE GROVER, Secretary.

Cardiff, April 10, 1874.

THE Oldham Corporation Gas and Water Works Committee is prepared to SELL BY TENDER the following GAS PLANT, or any portion thereof:—

One 7-in. Gas Station-Meter, in circular case, with hydraulic-valves, bye-pass, clock, and pressure-gauge complete.

One wrought-iron Hydraulic Main, 35 ft. long, and 18 in. diameter, with 12 cast-iron branches rivetted on.

One wrought-iron Scrubber, 11 ft. 9 in. by 6 ft., with grids, man-hole, and cover complete.

One wrought-iron Scrubber, 18 ft. 6 in. by 5 ft. 9 in., with grids, man-hole, and cover complete.

One wrought-iron Scrubber, 18 ft. 6 in. by 6 ft. 4 in., with grids, man-hole, and cover complete.

Six 12-in. cast-iron Hydraulic Valves or Traps, with covers and fastenings complete.

One Water Condenser, consisting of one cast-iron cistern, 21 ft. 3 in. by 10 ft. 6 in. by 2 ft. 7 in., with five rows of 12-in. cast-iron pipes, partitions, and covers complete.

A quantity of 12-in. cast-iron Connexion-Pipes

Further information may be obtained on application at the Gas and Water Works Offices, Oldham.

Tenders (endorsed), stating the price for each article separately, will be received up to Tuesday, May 12, 1874.

By Order,
H. BOOTH, Town Clerk.

PATENT FUEL AND LIME FOR
PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

JAMES GREGORY AND SONS,

MANUFACTURERS OF EVERY DESCRIPTION OF

Corporate Mark
SOHO
Granted 1763.

STEEL TOOLS FOR GAS & WATER WORKS.

All-Steel Charging and Stoking Shovels, Coke Screens and Forks, Steel Scoops, Picks, Mattocks, Axes, Trowels, &c.

WELDING STEEL RAKE AND SPUD HEADS.

SUPERIOR CAST-STEEL FILES and SAWS; Solid Cast-Steel Hand and Sledge Hammers.
BEST CAST STEEL for making Chisels, Turning Tools, Taps and Dies, Drills, Snaps, &c.
SINGLE AND DOUBLE SHEAR, Spring, Sheet, and Blister Steel.
SILVER STEEL for Rod-Chisels and Diamond-Points for Cutting Cast-Iron Pipes, and for other work requiring a Special Quality and Temper, and every other description of Steel and Tools as supplied to the largest London Gas Companies, Contractors, and Engineers.

SOHO STEEL-WORKS, SHEFFIELD, & 2, GRESHAM BUILDINGS, BASINGHALL ST., LONDON, E.C.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL,
SAMUEL H. JOHNSON,
} Joint Managing Directors.

CITY OF SARATOV, EMPIRE OF RUSSIA.

THE SARATOV WATER-WORKS COMPANY, LIMITED.

Issue of 6000 Six per Cent. Original Shares of £20 each,

INTEREST ON WHICH AT SIX PER CENT., AFTER DEDUCTION OF THE ESTIMATED WORKING EXPENSES, IS COVERED BY THE MUNICIPAL GUARANTEE.

A MINIMUM RENTAL OF 73,000 ROUBLES (OR NEARLY £10,000) PER ANNUM IS GUARANTEED BY THE MUNICIPALITY OF SARATOV.

DATES OF PAYMENT.

£2 per share, payable on application; £3 per share, payable on allotment; £5 per share, payable on the 1st of June, 1874; £5 per share, payable on the 1st of August, 1874; £5 per share, payable on the 1st of October, 1874—£20.

Interest at the rate of Six per cent. per annum from the date of payment of each instalment is guaranteed during construction by the British and Foreign Water and Gas Works Company, Limited, after which period the Municipal Guarantee comes into force.

DIRECTORS { J. T. CARBONELL, Esq., Director of the Grand Junction and Beyrouth Water-Works Companies.
LYNCH WHITE, Esq., The Grange, Clapham Common.
Colonel T. G. GLOVER, R.E., 66, Old Broad Street.
C. A. FESCH, Esq., late of the Berlin Water-Works, Managing Director.

ENGINEERS—Messrs. JOSETH QUICK and SON., M. Inst. C.E.

SOLICITORS { Messrs. NORTON, ROSE, NORTON, and BREWER, 6, Victoria Street, Westminster Abbey, S.W.
Messrs. ASHURST, MORRIS, and CO., 6, Old Jewry, E.C.

BANKERS—Messrs. GLYN, MILLS, CURRIE, and CO., 67, Lombard Street, E.C.

BROKERS—Messrs. LAURENCE, SON, and PEARCE, 13, Copthall Court.

AUDITORS—Messrs. COOPER BROTHERS and CO., 14, George Street, Mansion House, E.C.

SECRETARY (*pro tem.*)—Mr. H. HULFORD.

OFFICES (pro tem.)—BARTHOLOMEW HOUSE, E.C.

The Company has been established for the purpose of supplying Water-Works to the town of Saratov, on the Volga, in South Russia, under Concession granted by the Municipality for a period of 40 years from the completion of the works, which gives to the Company a monopoly of the right to supply the town with water during that period, and further grants, free of cost, the lands necessary for the erection of the works, and relieves the Company from all municipal taxes.

The works are being carried out under the direction of Mr. Joseph Quick and Son, the Water Engineers, who have lately completed the Odessa Water-Works with such marked success. The contract provides that the works shall be opened by the end of the year.

The Concession contains an absolute guarantee from the Municipality that the annual consumption of water shall produce a minimum revenue of 73,000 roubles, which, at the present rate of exchange, is nearly £10,000 per annum.

Saratov is one of the most important cities in Russia. The population is now over 100,000, and it is yearly on the increase. In summer the population is increased by about one-third, owing to its being a great commercial entrepôt of Central Russia. At present water is freely purchased at 3s. 6d. to 4s. 6d. per 1000 gallons; with the monopoly of supply or at below 2s. 1d. per 1000 gallons, it is evident that the sale will be a large one.

The capital of the Company is £189,000, divided into 9000 shares of £20 each.

Of these, the 6000 original shares now offered (to be called ordinary shares), will, out of the annual net profits, be entitled to receive a dividend of 6 per cent. per annum, before any dividend will be paid on the remaining 3000 (to be called deferred shares), which latter will be entitled to receive a dividend of 6 per cent. per annum after payment of the dividend on the ordinary capital. The surplus profits will be divided rateably between both classes of shares.

Interest at the rate of 6 per cent. per annum on the 6000 original shares now offered for subscription, after payment of the estimated working expenses for the consumption guaranteed, is covered by the guarantee.

In order to ensure efficient management the directors have secured the services of Mr. C. A. Fesch, whose connexion with the Berlin Water-Works will shortly cease in consequence of the purchase of the works by the Municipality.

From a calculation made by the engineers of the Company, as contained in their annexed report, it appears that within twelve months from the completion of the works, the revenue of the Company will be £22,700 per annum, which, after deducting working expenses and 1 per cent. per annum for the sinking-fund, will pay more than 8 per cent. per annum upon the whole capital of the Company.

The shares of the Odessa Water-Works Company, Limited, are now in demand at 4 premium. The capital of that Company is £850,000. The town of Saratov contains a population equal to one-half that of Odessa, while the entire capital of this Company is only £180,000. It may, therefore, be fairly assumed that the dividends in this Company will considerably exceed those of the Odessa Company.

Investment, therefore, in the present issue combines the security afforded by the guarantee of the Municipality, with the remunerative profit usually derived from water-works, a profit which is shown by the large premiums which the shares of water-works companies command in the market.

Interest will be paid on the 1st day of April and the 1st day of October in each year. The first payment will be made on Oct. 1, 1874.

Arrangements have been made, and contracts entered into, on behalf of the Company for the construction and acquisition of the water-works, including the purchase of the Concession and all preliminary expenses, and interest during construction (at the rate of 6 per cent. per annum) on the ordinary shares, for the sum of £110,000 and £45,000 in deferred shares. The Company will thus have as working capital the proceeds of £10,000 ordinary and £15,000 deferred shares.

A certified copy of the Concession, with a notarial translation, and also the Memorandum and Articles of Association, and the agreements entered into, may be inspected at the Offices of Messrs. Norton, Rose, Norton, and Brewer, the Solicitors of the Company, 6, Victoria Street, Westminster Abbey, S.W.

Application for shares must be made on the form annexed, accompanied by a deposit of £2 per share.

Failure to pay any instalment on the date when the same shall become due will render all previous payments liable to forfeiture. Should an applicant not receive any allotment, the deposit paid will be returned forthwith without deductions, and should a smaller amount be allotted than applied for, the balance paid on application will be applied towards payment of the amount payable on allotment.

Prospectuses can be obtained at the Offices of the Company, Bartholomew House, Bartholomew Lane, or from the Brokers of the Company.

London, April 21, 1874.

The following Contracts have been entered into:—

Memorandum of Agreement, dated the 21st of April, 1874, between the Company of the one part, and the British and Foreign Water and Gas Works Company, Limited, of the other part.

Indenture of the same date, between the British and Foreign Water and Gas Works Company, Limited, of the first part, the Company of the second part, and Henry Labouchere and Joseph Quick, Esqrs., of the third part.

29, *Great George Street, Westminster, S.W., March* 9, 1874.

SARATOV WATER-WORKS.

Gentlemen,—In accordance with your request, we beg to report that we have for some time past been engaged in carrying out the water-works for the supply to the City of Saratov.

The water will be taken from the river Volga, and pumped thence into high service reservoirs, whence, after filtration, it will be distributed by gravitation to the town.

A large portion of the materials is already shipped, and the construction of the works is so far advanced, that there is every probability of their being opened by the end of the present year.

The population of Saratov is over 100,000, and the whole of the water at present used has to be carried in carts to the houses. Our resident engineer, in a letter dated so recently as Saratov, February 21, reports his strong conviction that in a year's time from the completion of the works the consumption of water will be sufficient to produce a gross revenue of £22,700 per annum; and judging from our experience with other Russian Continental works, we have every reason to have confidence in this statement. The amount of 73,000 roubles guaranteed by the Municipality will be more than sufficient to pay the working expenses on that amount of consumption, and the interest on the ordinary shares of £120,000.—We are, gentlemen, your obedient servants,

JOSEPH QUICK AND SONS, Engineers.

To the Directors of the Saratov Water-Works Company, Limited.

Issue of 6000 Six per Cent. Original Shares of £20 each, entitled to a dividend of 6 per cent. in priority to the Deferred Shares of the Company, in accordance with the Prospectus of

THE SARATOV WATER-WORKS COMPANY, LIMITED

LONDON.

FORM OF APPLICATION.

(To be retained by the Bankers.)

To the Directors of the Saratov Water-Works, Company, Limited.

Gentlemen,—Having paid to your credit, at your Bankers, Messrs. Glyn, Mills, Currie, and Co., the sum of pounds, being £2 per share on Six per Cent. Original Shares of the Saratov Water-Works Company, Limited, of £20 each, I request you to allot me that number of shares; and I hereby agree to accept the same, or any smaller number that may be allotted to me, and to pay the balance due thereon, according to the terms of the Prospectus.

Name in full.....
Address .....
Profession (if any).....
Date .....April, 1874.
Signature .....

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

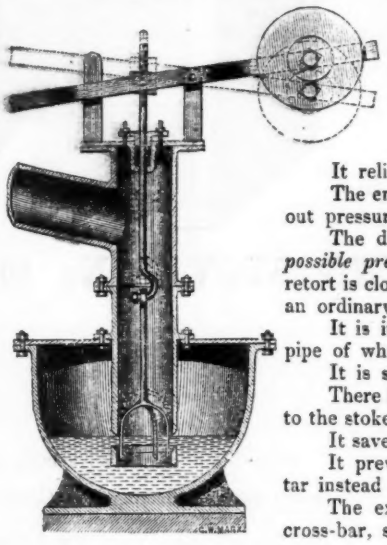
LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

CAFFALL, THOMAS, AND CO., LIMITED.



PATENT IMPROVED SEAL
FOR
GAS HYDRAULIC MAINS.

It relieves the retorts from all pressure during the time gas is being made.

The end of the dip-pipe not being immersed in the tar, permits the gas to pass freely, and without pressure, from the retort into the hydraulic main.

The dip-pipe can be effectually sealed without trouble, to resist the back rush of gas, *to any possible pressure*, during the time of charging; but in the event of the Seal being left on, after the retort is closed, no inconvenience is caused, as the piece of pipe used as the Seal only lengthens it to an ordinary dip-pipe.

It is inexpensive, and can be easily and readily applied to any existing hydraulic main and dip-pipe of whatever shape or size, at a trifling cost.

It is simple in its arrangement, and cannot get out of order.

There is no deposit of carbon on the top of the retort, thereby saving considerable time and trouble to the stokers when drawing and charging, also the injury caused by scurfing the retort is avoided.

It saves 10 per cent. of the coal carbonized; also the same proportion of fuel, retorts, labour, &c.

It prevents the thickening of the tar in the hydraulic main, as the heated gas passes *over* the tar instead of being forced *through* it.

The extension piece of pipe is moved by a lever, from which hangs a $\frac{3}{8}$-inch rod, hooked on the cross-bar, so that the lid of the retort cannot be struck without first sealing the pipe.

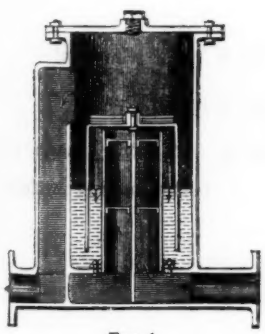


FIG. 1.

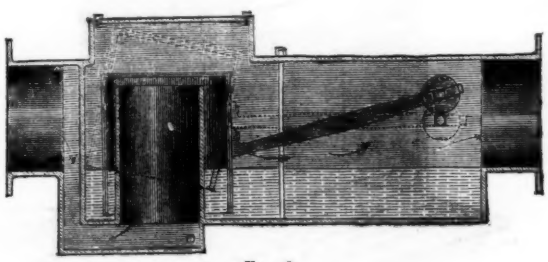


FIG 3.

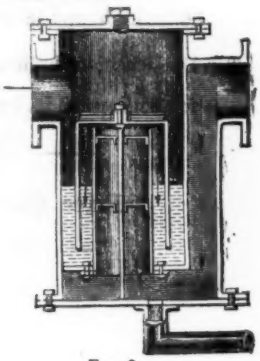


FIG. 2.

BYE-PASS FOR EXHAUSTER (Fig. 1).

This Hydraulic Bye-Pass has been invented for the purpose of supplying to gas companies a cheap, effective, and self-acting valve. It is simple in its construction, cannot get out of order, perfect in its action, can be made to stand any pressure, occupies very little space, and can be adapted to any existing pipes.

Fig. 2 is a Valve similar to Fig. 1, but made to act as a self-acting hydraulic bye-pass for washers, condensers, scrubbers, and meters; the Valve part being *below* the inlet and outlet, so that it may be applied to underground mains. Both Valves can be fitted to existing mains without disturbing them, more than the cutting out of a sufficient length to permit the fitting in of the Valve; after being properly fitted, they will require no further attention.

SELF-ACTING HYDRAULIC SAFETY-VALVE (Fig. 3),

For preventing the back flow of gas from the gasholder, and thereby preventing the possibility of accidents (the great damage and danger to life and property resulting therefrom) through the breaking of pipes, unsealing of purifiers, or any other cause. It is easy and prompt in its action, for upon the forward pressure of the gas ceasing, the bonnet *instantly* closes over the stand-pipe, thereby effectually preventiag any return of the gas; no extra pressure is put upon any part of the works by its use, and it can be made to stand any required pressure.

Every information can be obtained, and Models seen, at the Offices of the Company,

28, GRACECHURCH STREET, LONDON, E.C.

TO MANAGERS AND DIRECTORS OF GAS COMPANIES.

JOHN WRIGHT & CO.,

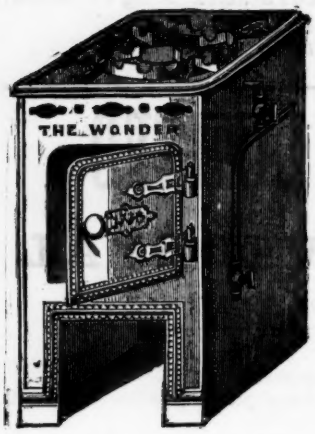
ESSEX WORKS, BIRMINGHAM,

Beg again to call your attention to the system of letting out their Stoves at a moderate rental. In this way the consumption of Gas is very greatly increased, and the Gas-Works made profitable by day as well as by night. Many companies adopted this suggestion when we first introduced it to their notice, and all are now proving its great advantages.

J. W. & Co. also beg to inform their friends that they have made such arrangements as will enable them to turn out very superior fine castings. Although they have made great additions in their producing power, they would still solicit the favour of early orders, as their resources are invariably taxed to the utmost in the height of the season.

THE "WONDER" GAS COOKER.

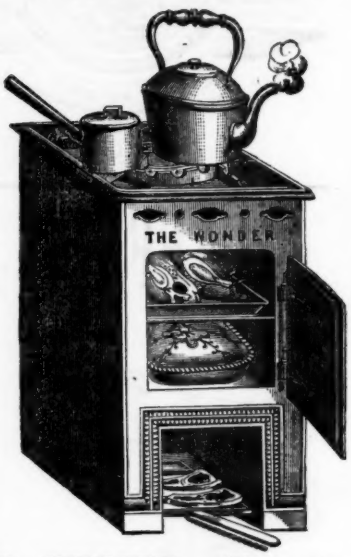
No. 55.



These Engravings show this Stove in use, as well as in general appearance. It will **boil, bake,** and **broil,** as shown, and is most convenient and economical, both in first cost and in use, and, having **no** Gas **inside** the oven, meets with general approbation.

Size—25½ in. high, 14 in. wide, 12½ in. back to front.

Price £2 10s. complete, with Pan & Gridiron.



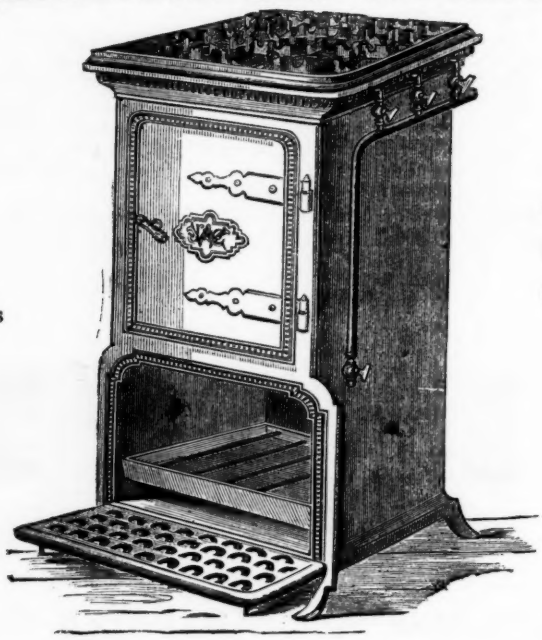
REGISTERED REFLECTOR GAS COOKING STOVE. No. 56.

SIZE.

36 in. high, and 18 in. wide.

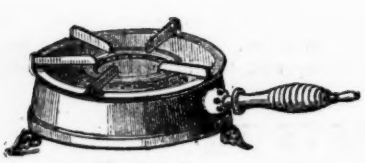
Top Hot-Plate, with Three Burners for Boiling, 22 in. by 16 in.

Price £5.



In addition to the advantages of every other Reflecting Gas Cooker, the Manufacturers claim the following:—

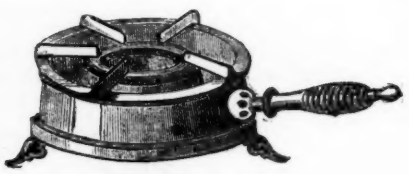
1. **A larger Hot Plate.**
2. **A larger Oven.**
3. **A far better-made and better-looking Article.**



No. 906.
Price 6s. 6d.
Diameter, 7 inches.

No. 902.
Price 3s. 6d. Diameter, 6 in.

No. 904.
Price 4s. Diameter, 6½ in.



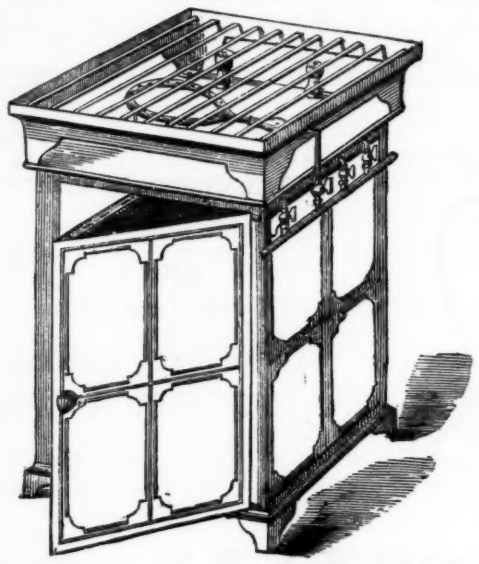
No. 908.
Price 8s.
Diameter, 9 inches.

The Air Bulb in these Stoves is placed so as to hold the burner firmly, thus preventing the burner getting loose when the wooden handle shrinks by the heat.

A Liberal Discount allowed to the Trade.

PORCELAIN GAS COOKER.

No. 140.



Size of Stove . . . . . 18 by 20 inches.
Size of Top Hot Plate . . . . 20 by 22 „
Height . . . . . 36 inches.

Price £9 9s.

SQUARE GAS COOKER.

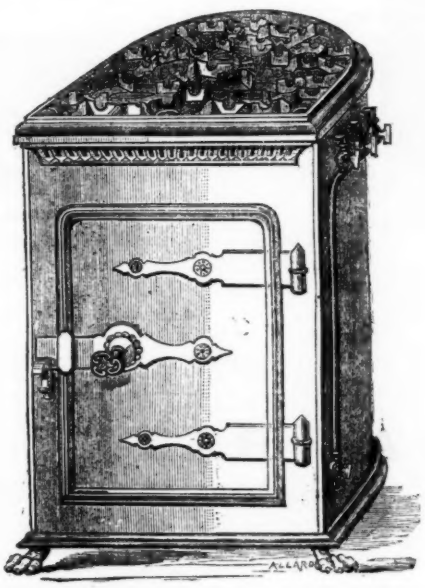
No. 64.

Size of Stove . . . . . 18 by 18 inches.
Size of Hot Plate . . . . . 21¼ by 21¼ „
Height . . . . . 36 inches.

Price £6 6s.

LARGER SIZES KEPT IN STOCK.

The peculiarity of these Stoves is that the Hot Plate and Front both project some inches beyond the Oven.



No. 150.

With one Burner for Boiling.

	High.	Wide.	Deep.
Outside,	30 in.	15 in.	16 in.
Inside,	19 in.	12 in.	12 in.

Price £2.

No. 152.

	High.	Wide.	Deep.
Outside,	30 in.	20 in.	20 in.
Inside,	19½ in.	14 in.	17 in.

With 3 Burners for Boiling.

Price £3 8s.

No. 154.

	High.	Wide.	Deep.
Outside,	36 in.	24 in.	22 in.
Inside,	24 in.	18 in.	18½ in.

With 3 Burners for Boiling.

Price £6 6s.

GAS TRIVET,

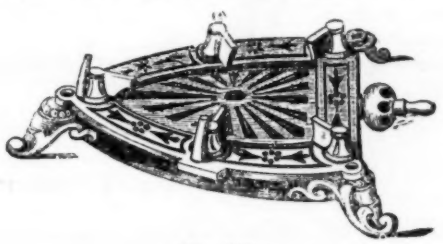
For hanging on the Bars of a Stove or Range.

No. 422.

Price 5s. each.

REGISTERED IRONING STOVE AND STAND,

For Flat Irons and Hatters' Irons.



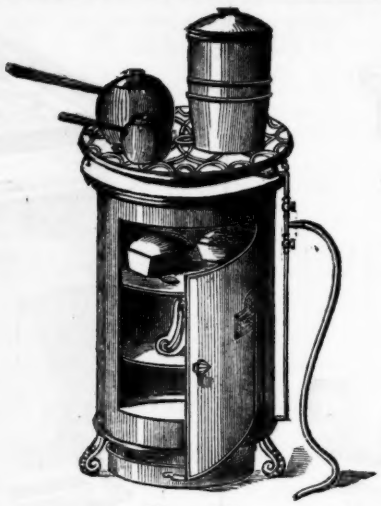
No. 247.

Price as Engraving, 5s. Ditto with Wood Handle, 6s. 6d.

A Liberal Discount allowed to the Trade.

ROUND GAS COOKING STOVE.

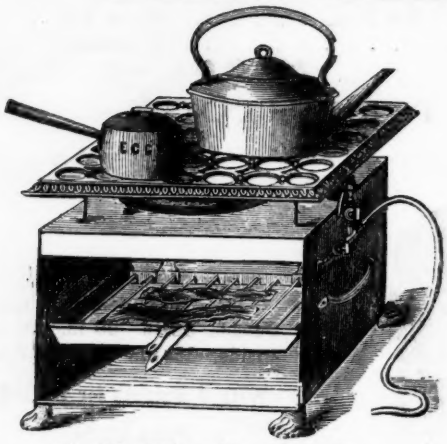
14 in. diameter, with
16 in. Hot Plate.
50s.



16 in. diameter, with
18 in. Hot Plate.
60s.

No. 67.

BREAKFAST COOKERS.



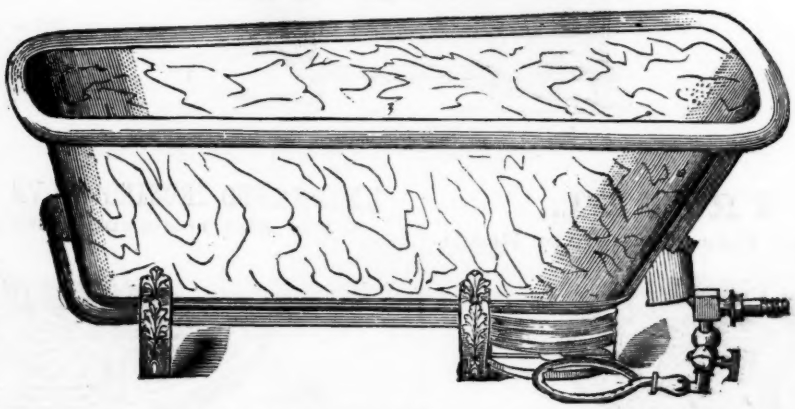
No. 62.—12 in. wide. Price 28s.
No. 63.—16 in. wide. Price 42s.
With one of the above all the cooking for a breakfast can be done at a
cost of one Farthing.

No. 620.—Price 34s.
Same as No. 62, but stronger, more compact, and better finished.
Width 14 in.; Height 14 in.; Depth 11 in.

GAS BATHS.

No. 701.
5 feet long.
Price, £6 17s. 6d.

Japanned White Marble inside and Oak outside, with connections for supply and waste pipes.



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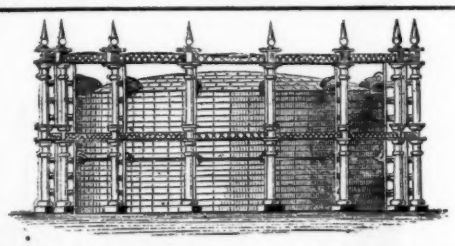

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LONDON, 1862.

Class 13.

PARIS. 1867.

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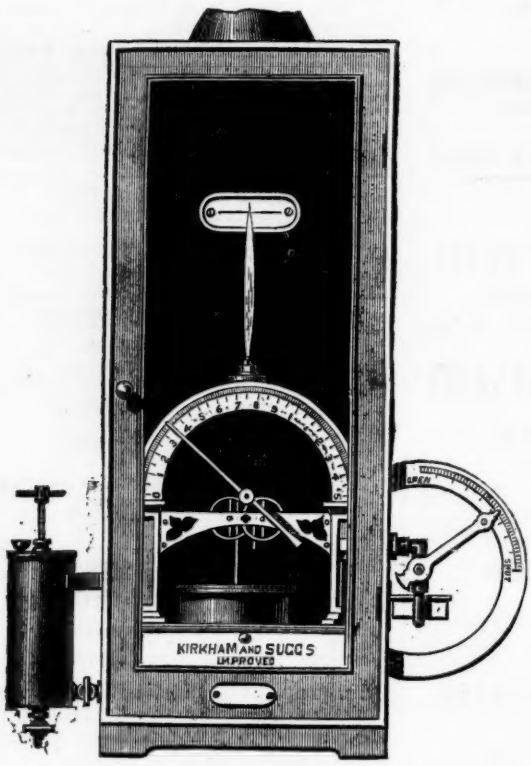

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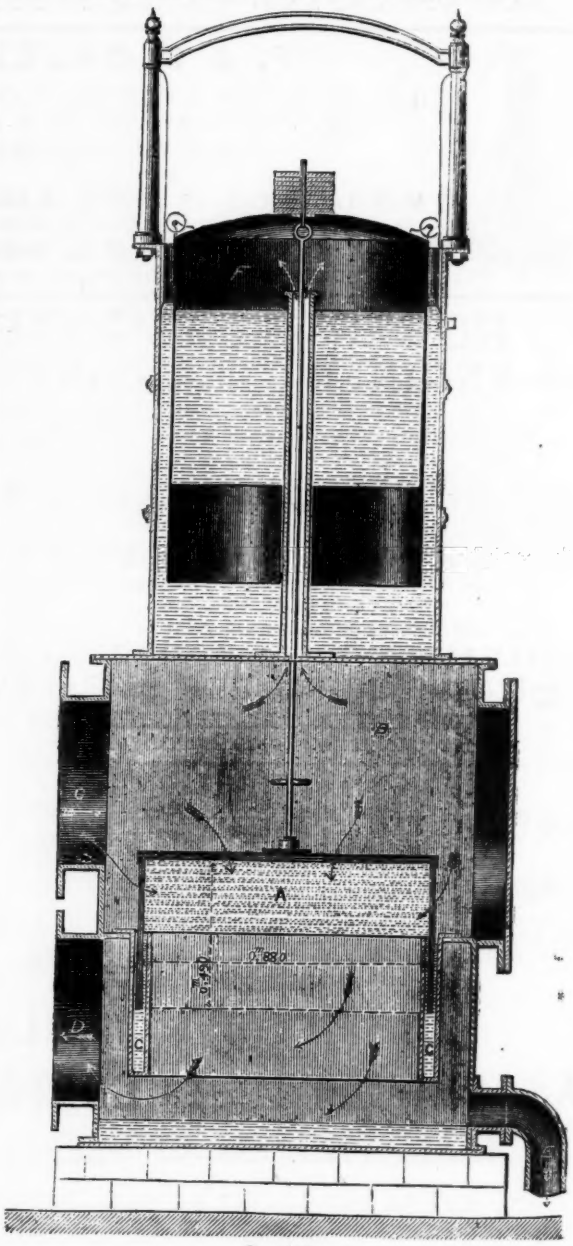

Description.

A.—Condensing apparatus, properly so called.
B.—Chamber in which the apparatus moves.
C.—Inlet for gas.
D.—Outlet for gas after passing condensing apparatus.
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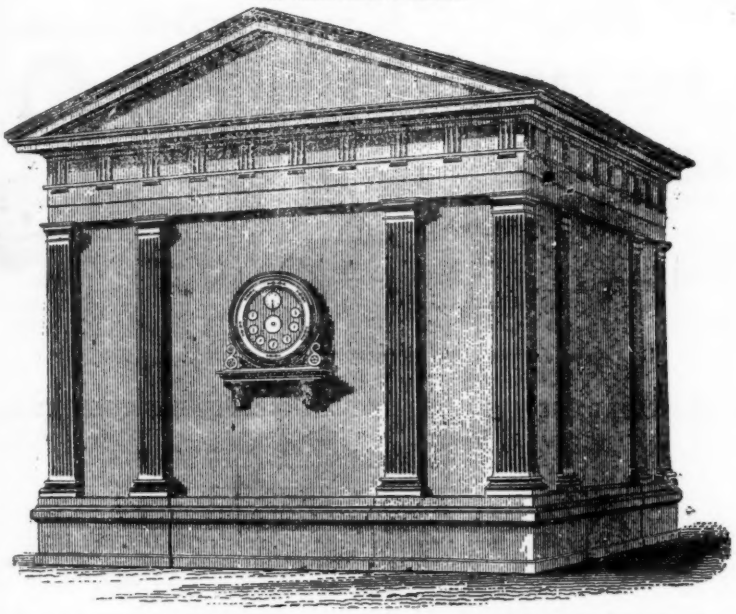

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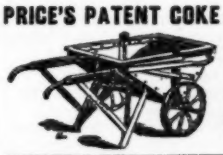

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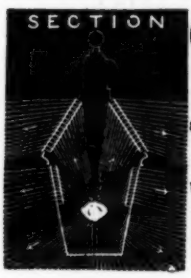

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Plain, Turned and Bored, and Coated.
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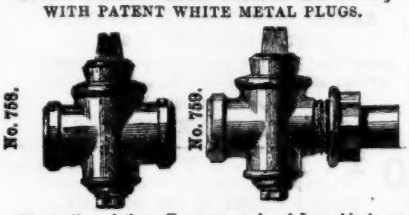
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.
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This Coal, according to the report of the analyst, yields 11,110 cubic feet of gas per ton, and has an illuminating power of 33·97 candles per 5 cubic feet per hour.
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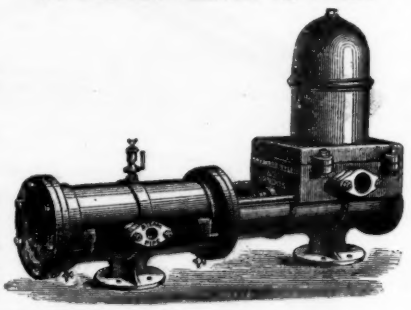

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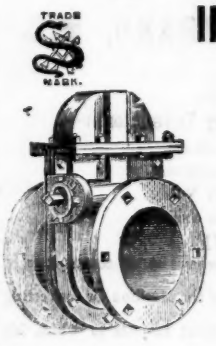
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS,



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VALVES MADE WITH OUTSIDE RACKS TO ORDER.
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Beg leave to call the attention of Gas Companies to the superior quality of their
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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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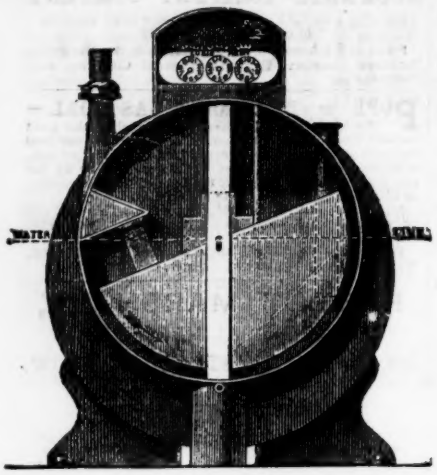

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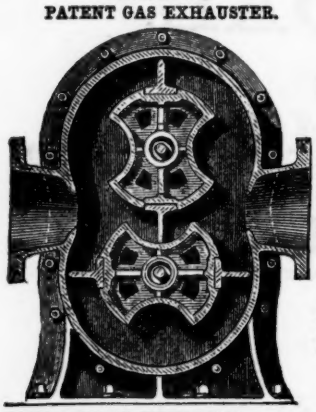

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